

Backwash filter

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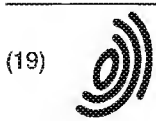
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The backwashing filter contains a number of independent filter candle elements seated in a rotating plate so that each element can be moved into an isolated backwash chamber.

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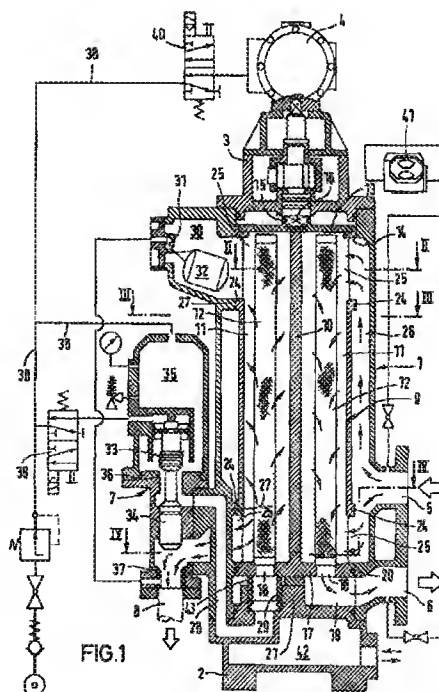
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(54) Rückspülfilter

(57) Der erfindungsgemäße Rückspülfilter weist im Inneren seines Filtergehäuses (1) eine Gruppe von Filtereinheiten mit Filtereinsätzen (12) auf, die im gemeinsamen Filtergehäuse mittels eines Stellantriebs (4) auf einer Umlaufbahn bewegbar sind, die auf mindestens einem Teilabschnitt ihrer Länge eine Rückspülzone für die Rückspülung des jeweils in dieser Rückspülzone befindlichen Filtereinsatzes (12) bildet. Vorzugsweise sind dabei sämtliche Filtereinsätze in Filterkammern (11) eines Drehkörpers (9) angeordnet, der im Filtergehäuse um seine Achse drehbar gelagert ist, so daß die Filterkammern (11) mit den darin befindlichen Filtereinsätzen auf der Umlaufbahn des Drehkörpers (9) infolge in eine Rückspülzone gelangen, in der sie rückgespült werden können.



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Beschreibung

[0001] Die Erfindung betrifft einen Rückspülfilter entsprechend der im Oberbegriff des Anspruchs 1 angegebenen Art.

[0002] Rückspülfilter, die zur Filterung von Flüssigkeiten und bevorzugt von Kraftstoffen und Schmierölen eingesetzt werden, sind seit langem in verschiedenen Ausführungen bekannt und in großen Stückzahlen im Einsatz. Sie weisen zwei oder mehr an einem gemeinsamen Filter-Grundgehäuse stehend angeordnete Filterkammern auf, die Filtereinsätze, Zumeist in Form von Filterkerzen, aufnehmen (DE 18 01 441 C3, EP 0 361 217 B1, EP 0 656 223 A1). Dabei ist die Anordnung regelmäßig so getroffen, daß die Filterkammern mit den hierin befindlichen Filtereinsätzen unabhängig voneinander in Gegenstrom zum Filterbetrieb rückgespült werden können, während sich die anderen Filterkammern weiterhin im Filterbetrieb befinden.

[0003] Die zu Reinigungszwecken erforderliche Rückspülung der einzelnen Filterkammern und der in ihnen befindlichen Filtereinsätze erfolgt im allgemeinen mit Hilfe der Trübe, also der Schmutzflüssigkeit, kann aber auch mit Hilfe des bereits gefilterten Filtrats oder mit Hilfe von Trübe und Filtrat erfolgen, wobei die im Rückspülbetrieb ausgespülten Schmutzstoffe über einen Schlammbaufl mit zugeordnetem Schlammbauflventil abgeführt werden. Für die Einzelrückspülung der Filterkammern weisen die bekannten Rückspülfilter eine von Hand oder zeit- oder differenzdruckgesteuerte Rückspülvorrichtung mit einem Rückspülventil auf, das im Inneren des Filtergehäuses bzw. des die Filterkammern tragenden Grundgehäuses angeordnet ist und sich in der Verbindung zwischen der in der Rückspülposition befindlichen Filterkammer und dem Schlammbaufl befindet. In der Praxis bewährt haben sich Rückspülsysteme mit Drehschiebern, bei denen die Rückspülung unterstützend durch ein eingeleitetes Druckgas, zumeist Druckluft, erfolgt, welches bei Öffnen eines Druckgasventils die sich in der rückzuspülenden Filterkammer befindliche Rückspülflüssigkeit schlagartig beschleunigt, so daß ein den Abreinigungsprozeß des Rückspülmediums verbessernder Stoßeffect erzielt wird (EP 0 361 217 B1).

[0004] Bei den bekannten Mehrkammern-Rückspülfiltern befindet sich die Rückspülvorrichtung im Inneren des die Filterkammern tragenden Filter-Grundgehäuses an schwer zugänglicher Stelle. Außerdem handelt es sich bei den bekannten Rückspülfiltern um verhältnismäßig groß und aufwendig bauende Filterapparate.

[0005] Aufgabe der Erfindung ist es vor allem, einen Rückspülfilter für die Filterung von Flüssigkeiten, vorzugsweise von Kraftstoffen, Schmierölen u.dgl., zu schaffen, der gegenüber den herkömmlichen Rückspülfiltern kompakter, wartungsfreundlicher und möglichst auch einfacher bauen kann.

[0006] Diese Aufgabe wird erfindungsgemäß dadurch gelöst, daß die Filtereinsätze mittels eines Stellantriebs

im Filtergehäuse auf einer gemeinsamen Umlaufbahn bewegbar sind, die auf mindestens einem Teilabschnitt ihrer Länge eine Rückspülzone für die Rückspülung des jeweils in dieser in der Rückspülkammer befindlichen Filtereinsatzes bildet. Dabei sind die Filtereinsätze des Rückspülfilters zweckmäßig jeweils in einer eigenen Filterkammer angeordnet, wobei die Filterkammern auf dem Teilbereich der Umlaufbahn, auf dem die Filterung erfolgt, an den gemeinsamen Trübeeinlaß und den Filtratauslaß des Filtergehäuses und auf dem die Rückspülzone bildenden Teilabschnitt an den Rückspülkreis angeschlossen sind. Die einzelnen Filtereinsätze bzw. die sie aufnehmenden Filterkammern sind vorteilhafterweise an einem gemeinsamen, von dem Stellantrieb angetriebenen Filterträger über die Umlaufbahn beweglich angeordnet.

[0007] Abweichend von den bekannten und gebräuchlichen Rückspülfiltern, bei denen die Filterkammern feststehend am Filtergehäuse angeordnet und zur Rückspülung einzeln durch Ventilbetätigung auf Rückspülbetrieb schaltbar sind, sind bei dem erfindungsgemäßen Rückspülfilter die von den Filtereinsätzen gebildeten, zweckmäßig jeweils in einer eigenen Filterkammer angeordneten Einzelfilter im gemeinsamen Filtergehäuse so gelagert, daß sie mit Hilfe des Stellantriebs über eine Umlaufbahn bewegt werden können, in der sich mindestens eine Rückspülzone befindet, in der die Abreinigung des jeweiligen Filtereinsatzes im Rückspülbetrieb erfolgt. Die Umlauf- bzw. Bewegungsbahn weist also auf einer Teillänge eine Rückspülzone auf, in der die sich jeweils hierin befindliche Filter- bzw. Rückspülkammer mit dem darin angeordneten Filtereinsatz von dem Filterkreislauf der anderen, im Filterbetrieb stehenden Filtereinheiten getrennt im Rückspülbetrieb abgereinigt wird. Diese Ausführung des Rückspülfilters ermöglicht eine kompakte Bauweise desselben und ermöglicht auch Bauvereinfachungen, da alle Filtereinheiten sich im Inneren des gemeinsamen Filtergehäuses befinden können. Zugleich läßt sich auch die Rückspülvorrichtung mit dem Rückspül- und Schlammbauflventil außenseitig am Filtergehäuse anbauen, wodurch sich ebenfalls Bauvereinfachungen und auch Vorteile bezüglich der Wartung der Rückspülvorrichtung und ihrer Ventile ergeben. Für eine etwaige Entlüftung der die Filtereinsätze aufnehmenden Filterkammern nach erfolgter Rückspülung kann für alle Filtereinheiten ein gemeinsames Entlüftungsventil vorgesehen werden, insbesondere in der bekannten Ausführung als schwimmergesteuertes Entlüftungsventil. Bau- und Montagevereinfachungen lassen sich auch dadurch erreichen, daß durch Öffnen des Filtergehäuses alle Filtereinsätze zugänglich werden.

[0008] In bevorzugter Ausführung ist bei dem erfindungsgemäßen Rückspülfilter die Anordnung so getroffen, daß die einzelnen, von den Filtereinsätzen gebildeten Filtereinheiten mit Hilfe des Stellantriebs auf einer kreisbogenförmigen Umlaufbahn beweglich sind,

auf der sich mindestens eine Rückspülzone befindet, obwohl grundsätzlich auch eine Gestaltung des Rückspülfilters möglich ist, bei der die einzelnen Filtereinheiten über eine von der Kreisbahn abweichende Umlaufbahn bewegt werden. Bei kreisbogenförmiger Umlaufbahn kann der Filterträger aus einem im Filtergehäuse angeordneten Drehkörper bestehen, an dem die Filtereinsätze um dessen Drehachse herum, vorzugsweise in gleichen Winkelabständen zueinander, angeordnet sind, wobei der Stellantrieb aus einem den Drehkörper um die Drehachse drehenden Drehantrieb besteht und die Rückspülzone sich über einen Teilumfang der kreisförmigen Umlaufbahn des Drehkörpers erstreckt. Vorzugsweise ist hierbei der Drehkörper mit über seinen Umfang herum in Bogenabständen zueinander angeordneten Filterkammern versehen, die jeweils einen Filtereinsatz aufnehmen und mit zu dem Trübeeinlaß und dem Filtratauslaß des Filtergehäuses sowie mit den der Rückspülung dienenden Durchflußkanälen versehen ist. Der Drehkörper ist zweckmäßig mit zu seiner Drehachse parallelen, die Filterkammern bildenden Taschen od.dgl. versehen. Dabei sind die Filterkammern zumindest an dem einen Ende des Drehkörpers, bevorzugt aber an den beiden Endbereichen desselben, zu der Innenseite des Filtergehäuses hin unter Bildung der Durchflußkanäle offen, wobei der Drehkörper in diesem Endbereich im Querschnitt etwa sternförmig ausgebildet sein kann. Weiterhin wird die Anordnung zweckmäßig so getroffen, daß im Filterbetrieb des Rückspülfilters die Filtereinsätze bzw. Filterkerzen von der über den Trübeeinlaß des Filtergehäuses zugeführten Schmutzflüssigkeit von außen nach innen durchströmt werden, wobei die Schmutzflüssigkeit zweckmäßig in den beiden Endbereichen den Filterkammern und damit den Filterkerzen zugeleitet wird, während das Filtrat aus den Innenräumen der Filtereinsätze bzw. Filterkerzen zu dem gemeinsamen Filtratauslaß des Filtergehäuses abgeleitet wird. Vorteilhafte Ausgestaltungsmerkmale des erfindungsgemäßen Rückspülfilters in der bevorzugten Ausführung mit einem um seine Drehachse drehbaren Drehkörper sind in den einzelnen Ansprüchen angegeben, auf die hier Bezug genommen werden kann.

[0009] Im allgemeinen genügt es, wenn in jeder Filterkammer des Rückspülfilters als Filtereinsatz nur eine einzige Filterkerze vorgesehen wird, obwohl selbstverständlich auch die Anordnung mehrerer, paralleler Filterkerzen möglich ist. Für die Rückspülung wird bei dem erfindungsgemäßen Rückspülfilter zweckmäßig mit einem druckgasbeaufschlagten Spülmedium gearbeitet, wie dies an sich bekannt ist. Dabei kann der Spülvorrichtung eine Druckgas-Speicherkammer zugeordnet sein, die durch Betätigung des Spülventils mit der in der Rückspülposition befindlichen, hier die Rückspülkammer bildenden Filterkammer verbunden wird, so daß die Rückspülung mit Hilfe des in dieser Kammer befindlichen Filtrats und/oder der Trübe durch stoßartige Druckluftbeaufschlagung unter guter Abreini-

gung des Filtereinsatzes bewirkt wird und folglich die Schmutzstoffe bei geöffnetem Schlammablaßventil über den Schlammablauf abgeführt werden. Das Spülventil und das Schlammablaßventil sowie die Druckgas-Speicherkammer können eine kompakte Baueinheit bilden, die, wie erwähnt, außenseitig am Ventilgehäuse lösbar angebaut werden kann.

[0010] Weitere vorteilhafte Ausgestaltungsmerkmale des erfindungsgemäßen Rückspülfilters sind in den einzelnen Ansprüchen angegeben und werden nachfolgend im Zusammenhang mit dem in der Zeichnung gezeigten Ausführungsbeispiel näher erläutert. In der Zeichnungen zeigen:

- Fig. 1 einen erfindungsgemäßen Rückspülfilter mit außenseitig angebaute Rückspülvorrichtung im Axialschnitt;
- Fig. 2, 3 und 4 jeweils den Rückspülfilter nach Fig. 1 in einem Querschnitt nach Linie II-II, III-III, IV-IV der Fig. 1.
- Fig. 5 im Längsschnitt den Drehkörper des erfindungsgemäßen Rückspülfilters ohne Filtereinsätze.

[0011] Zum Verständnis der Erfindung wird Bezug genommen auf die eingangs zum Stand der Technik genannten Druckschriften, insbesondere die EP 0 361 217 B1.

[0012] Der in den Fig. 1 bis 4 gezeigte Rückspülfilter weist ein angenähert zylindrisches Filtergehäuse 1 auf, das am Fuß ein lösbar angeschlossenes Fußstück 2 und am Kopf ein mit Flanschverschraubung ebenfalls lösbar angeschlossenes Kopfstück 3 trägt, welches seinerseits den Träger eines Stellantriebs in Gestalt eines Drehantriebs 4 bildet. Am Filtergehäuse 1 sind im unteren Bereich an einem Gehäuseflansch der Filter- bzw. Trübeeinlaß 5 und in verhältnismäßig dichtem Abstand darunter der Filtratauslaß 6 angeordnet. An der gegenüberliegenden Seite ist am Filtergehäuse 1 außenseitig die Rückspülvorrichtung 7 lösbar und auswechselbar angebaut, die somit an der Außenseite des Filtergehäuses gut zugänglich angeordnet ist. Der Schlammablauf der Rückspülvorrichtung 7 ist in Fig. 1 mit 8 bezeichnet.

[0013] Im Inneren des Filtergehäuses 1 ist als Filterträger ein Drehkörper 9 um seine Längsachse 10, die mit der Längsachse des Filtergehäuses 1 zusammenfällt, drehbar angeordnet, so daß er mit Hilfe des Drehantriebs 4 im Filtergehäuse 1 während des Filterbetriebs schrittweise gedreht werden kann. Der Drehkörper 9 weist auf seinem Umfang mehrere, hier vier in gleichen Umfangsabständen zueinander angeordnete Filterkammern 11 auf, die jeweils einen Filtereinsatz 12 in Gestalt einer Filterkerze aufnehmen, wobei die parallel zueinander und zur Drehachse 10 angeordneten Filtereinsätze bzw. Filterkerzen sich im wesentlichen über die gesamte Höhe des Drehkörpers

erstrecken. Der Drehkörper 9 ist an seinen beiden Enden jeweils mit einem drehfest an ihm angeordneten Verschlußstück versehen, das die um die Drehachse 10 herumgruppierten Filterkammern 11 überdeckt. Das am oberen Ende des Drehkörpers 9 befindliche Verschlußstück besteht aus einer lösbar am Drehkörper befestigten Kupplungsplatte 13, die hier die Filterkammern 11 verschließt und die, wie aus Fig. 1 erkennbar, z.B. durch Verschraubung lösbar an einem Lagerring 14 angeordnet ist, der sich in einer zylindrischen Lagerbohrung am Kopfende des Filtergehäuses 1 abstützt und bei der Drehbewegung des Drehkörpers führt. Die den Drehkörper 9 hier schließende Kupplungsplatte 13 ist mittig mit einer unrrunden, zur Plattenoberseite hin offenen Kupplungsöffnung 15 versehen, in die ein als Mehrkant ausgebildeter Kupplungszapfen 16 einfaßt, der sich auf der Abtriebswelle des Drehantriebs befindet, wodurch die antriebsmäßige dreh-schlüssige Kupplung zwischen Drehantrieb und Drehkörper hergestellt wird. Durch diese Kupplungsverbindung wird die Montage und Demontage des den Drehantrieb 4 tragenden Kopfstücks 3 erleichtert und die Möglichkeit geschaffen, den Drehkörper 9 mitsamt den Filtereinsätzen 12 nach oben oben aus dem Filtergehäuse 1 herauszunehmen bzw. von oben in dieses einzusetzen.

[0014] Das am anderen, unteren Ende des Drehkörpers drehfest angeordnete Verschlußstück besteht aus einer Lochplatte 17, die am Drehkörperende fest angeordnet ist und auf einem gemeinsamen Teilkreis aus Gewindebohrungen bestehende Plattenöffnungen 18 aufweist, in die die einzelnen Filtereinsätze bzw. Filterkerzen 12 mit ihren mit einem Außengewinde versehenen Fußende eingeschraubt sind, wobei die Innenräume der Filterkerzen an den Plattenöffnungen 18 mit einer gemeinsamen Filtrat-kammer 19 am darunterliegenden Fußstück 2 verbunden sind, die den Filtratauslaß 6 des Rückspülfilters aufweist. Die kreisrunde Lochplatte 17 ist an ihrem Außenumfang mit einer Umfangsdichtung in einer zylindrischen Lagerfläche 20 des Filtergehäuses 1 drehbar gelagert und mittig auf einem aufragenden Fußlager 21 des Fußstücks 2 drehbar abgestützt. Die Lochplatte 17 bildet also den Träger der Filtereinsätze 12 und dient zugleich zur Verbindung der Innenräume der Filtereinsätze mit der gemeinsamen Filtrat-kammer 19 und damit dem Filtratauslaß 6 des Rückspülfilters, wobei die Lochplatte zugleich der Drehverlagerung des Drehkörpers 9 im Filtergehäuse 1 dient. Abweichend von der Ausführungsform nach Fig. 1 kann gemäß Fig. 5 die Lochplatte 17 auch durch Axialverschraubung 22 mit dem Drehkörper 9 lösbar verbunden sein und an ihrem Umfang in einem fest mit dem unteren Ende des Drehkörpers 9 verbundenen Lagerring 23 gehalten sein, der in der ringförmigen Lagerfläche 20 des Filtergehäuses drehbar gelagert ist. Im Montagezustand befindet sich der Drehkörper mit der Lochplatte 17 zwischen dem Trübeeinlaß 5 und dem Filtratauslaß 6.

[0015] Die axialen Filterkammern 11 des Drehkörpers

9 sind jeweils über ihren größten Längenbereich in Umfangsrichtung geschlossen, werden also über den größeren Längenbereich der Filterkerzen von rohrförmigen Taschen od.dgl. gebildet, die an Lagerringen 24 auslaufen, so daß zwischen diesen Lagerringen und der Kupplungsplatte 13 bzw. der Lochplatte 17 zu dem inneren Umfangsraum des Filtergehäuses 1 hin offene Durchlaßöffnungen 25 gebildet werden, die im Filterbetrieb auf der Filtrierseite die Verbindung der Filterkammern 11 mit dem gemeinsamen Trübeeinlaß 5 herstellen. Aus Fig. 1 ist erkennbar, daß auf dem Längenbereich, an dem Filterkammern 11 über ihren ganzen Umfang geschlossen sind, die bogenförmigen Außenbegrenzungen der Filterkammern in einem Radialabstand zur Innenwandung des Filtergehäuses 1 liegen, so daß hier auf dem Umfangsbereich, auf dem im Filterbetrieb die Filterung erfolgt, ein ringsegmentförmiger Kanal 26 zwischen der Gehäusewand des Filtergehäuses 1 und dem Drehkörper gebildet wird, der der Verbindung des Trübeeinlasses 5 mit den jeweils im Filterbetrieb stehenden Filtereinsätzen zu den an den oberen und unteren Enden der Filterkammern angeordneten Durchlaßöffnungen 25 herstellt.

[0016] Die in den Filterkammern 11 am Drehkörper 9 in Parallelanordnung zueinander angeordneten Filtereinsätze 12 sind durch Drehbewegung des Drehkörpers 9 mit Hilfe des Drehantriebs 4 auf einer kreisbogenförmigen Umlaufbahn bewegbar, die auf mindestens einem Teilabschnitt ihrer Bogenlänge eine Rückspülzone für die Rückspülung der jeweils in dieser Rückspülzone befindlichen Filterkammer 11 bildet, die hier eine Rückspülkammer bildet, welche gegenüber dem Filterkreislauf zwischen dem Trübeeinlaß 5, den im Filterbetrieb stehenden Filterkammern 11 und dem Filtratauslaß 6 abgetrennt und abgedichtet ist. Dies erfolgt auf dem die Rückspülzone bildenden bogenförmigen Teilabschnitt der kreisbogenförmigen Umlaufbahn dadurch, daß auf diesem Teilabschnitt die in der Rückspülzone befindliche Filterkammer 11 durch die umlaufenden Lagerringe 24 an ringsegmentförmigen Gegenlagerflächen 27 dichtend und drehbeweglich abstützen, so daß hierdurch die Flüssigkeitsverbindung zu dem ringsegmentförmigen Kanal 26 und über diesen zum Trübeeinlaß 5 und zum Filtratauslaß 6 geschlossen wird. Außerdem ist die in der Rückspülzone befindliche Filterkammer 11 an ihrer Unterseite gegenüber der Filtrat-kammer 19 und dem Filtratauslaß 6 am Fußstück 2 abgedichtet. Die in der Rückspülzone befindliche Filterkerze ist hier an einem Rückspülkanal 28 im Fußstück 2 angeschlossen; dieser endet unterhalb der Plattenöffnung 18, an der die in der Rückspülzone befindliche Filterkerze durch Verschraubung angeschlossen ist. Demgemäß ist bei dem gezeigten Rückspülfilter die Anordnung so getroffen, daß von den vier Filterkammern bzw. den vier Filtereinsätzen 12 jeweils sich drei Filtereinsätze im Filterbetrieb befinden, während sich die vierte Filterkammer mit dem darin befindlichen Filtereinsatz der Rückspülposition innerhalb der Rück-

spülzone Z befindet, die sich etwa über ein Viertel der kreisförmigen Umlaufbahn des Drehkörpers 9 im Filtergehäuse 1 erstreckt (Fig. 2). Der vorgenannte Rückspülkanal 28 endet am Fußstück 2 in einer Axialbohrung, in der eine federbelastete Dichtbuchse 29 axialverschieblich angeordnet ist, die durch die Federkraft dichtend gegen die Unterseite der Lochplatte 17 gedrückt wird und damit die Plattenöffnung 18, an der sich die in der Rückspülzone befindliche Filterkerze befindet, gegenüber der Lochplatte abdichtet, so daß ein vom Filterkreislauf unabhängiger Rückspülkreislauf gebildet wird. Am oberen Ende weist das Filtergehäuse 1 eine radiale Gehäuseerweiterung auf, die einen Kopfraum 30 bildet, der über die Durchflußöffnung 25 der in der Rückspülzone befindlichen Filterkammer 11 mit dieser in Verbindung steht und an dem sich ein an sich bekanntes Entlüftungsventil 31 befindet, welches durch einen im Kopfraum angeordneten Schwimmer 32 gesteuert ist, wie dies bei Rückspülfiltern an sich bekannt ist.

[0017] Im unteren Endbereich der in der Rückspülzone befindlichen Filterkammer 11 ist diese über die hier angeordnete Durchflußöffnung 25 und eine zugeordnete Öffnung in der Wandung des Filtergehäuses 1 mit der Rückspülvorrichtung 7 und deren Schlammbablauf 8 verbunden.

[0018] Die auf dem Teilumfangsbereich der Rückspülzone außenseitig am Filtergehäuse 1 angebaute Rückspülvorrichtung 7 weist ein kombiniertes Rückspül- und Schlammbablaßventil auf mit den beiden über einen Kolbenschaft einstückig verbundenen Ventilkörpern 33 und 34, wobei der Ventilkörper 33 mit den ihm zugeordneten Ventilsitz 36 ein Druckgas- bzw. Druckluftventil bildet, welches in einer Verbindung zwischen einem an der Rückspülvorrichtung 7 angeordneten Druckgasspeicher 35 mit dem Rückspülkanal 28 angeordnet ist, der über die entsprechende Öffnung in der Lochplatte 17 mit dem Innenraum der in der Rückspülposition befindlichen Filterkerze steht. Der Ventilkörper 34, dessen Ventilsitz mit 37 bezeichnet ist, bildet das Schlammbablaßventil und steuert somit im Rückspülbetrieb den Schlammbablauf 8. Der Druckgasspeicher 35 ist zu seiner Aufladung mit dem Druckgas bzw. der Druckluft an ein Druckgas- bzw. Druckluftzuführungssystem 38 mit zugeordnetem Steuerventil 39 angeschlossen. An das gleiche Druckgas- bzw. Druckluftsystem 38 ist über ein Steuerventil 40 der als Druckgas- bzw. Druckluftmotor ausgebildete Drehantrieb 4 angeschlossen. Im gezeigten Ausführungsbeispiel bestehen die beiden Steuerventile 39 und 40 jeweils aus einem Schaltventil, das sowohl von Hand als auch elektromagnetisch steuerbar ist, um die Druckgasverbindungen herzustellen und zu schließen.

[0019] In Fig. 1 angedeutet ist eine Differenzdruck-Meßvorrichtung 41, die im laufenden Filterbetrieb die Drücke am Trübeeinlaß 5 und am Filtratauslaß 6 erfaßt und aus den ermittelten Druckwerten das jeweilige Schaltsignal in die Steuerung gibt, so daß bei einem

vorgegebenen Differenzdruck, welcher bestimmend ist für den Verschmutzungsgrad der Filtereinheiten, der Drehantrieb 4 über das Steuerventil 40 aktiviert und damit der Drehkörper 9 mit dem gesamten Filtereinsatz um einen Teilbereich im Filtergehäuse 1 weitergedreht wird, in der die nächstfolgende Filterkammer mit ihrem Filtereinsatz in die Rückspülzone gelangt und hier abgereinigt wird.

[0020] Im Filterbetrieb sind von den im gezeigten Ausführungsbeispiel vier auf einem gemeinsamen Kreisbogen angeordneten Filterkammern 11 jeweils drei auf einem gemeinsamen Bogenumfang von etwa 270° liegende Filterkammern 11 an den gemeinsamen Filterkreislauf angeschlossen, so daß die über die Trübeeinlaß 5 zuströmende Schmutzflüssigkeit, wie in Fig. 1 durch die Pfeile angedeutet, im Zuflußkanal 26 von oben und von unten über die Durchlaßöffnungen 25 in die drei Filterkammern einströmt und innerhalb dieser Filterkammern die Filtereinsätze bzw. Filterkerzen von außen nach innen durchströmen, wobei der ausgefilterte Schmutz an der äußeren Oberfläche der Filtereinsätze abgelagert wird. Das Filtrat fließt in den drei Filterkerzen nach unten und über die zugeordneten Plattenöffnungen 18 in die gemeinsame Filtratkammer 19 und über den Filtratauslaß 6 aus dem Rückspülfilter, z.B. zu einem Verbraucher. Gleichzeitig zu dem Filterbetrieb wird die vierte Filterkammer 11 mit dem hierin befindlichen Filtereinsatz 12 in der Rückspülzone rückgespült, wie dies in Fig. 1 ebenfalls durch Pfeile angegeben ist. Dabei wird das kombinierte Spül- und Schlammbablaßventil z.B. durch Druckluftansteuerung in die gezeigte Öffnungsposition gebracht, in der das Druckgas- bzw. die Druckluft aus dem Speicherraum 35 über das geöffnete Ventil 33 und den Rückspülkanal 28 von unten in die genannte Filterkerze schlagartig einströmt und dabei das in dieser Filterkerze befindliche Filtrat schlagartig beschleunigt, so daß es aus der Filterkerze nach außen ausgetrieben wird und der außenseitig an der Filterkerze anhaftende Schmutz abgetragen wird. Das Spülfiltrat mit dem Schmutz wird dann über die untere Durchlaßöffnung 25 und das geöffnete Schlammbablaßventil 34, 37 in den Schlammbablauf 8 abgeführt, wie dies in Fig. 1 ebenfalls durch Pfeile angedeutet ist. Zusätzlich kann durch die stoßartige Druckgasführung in die genannte Filterkammer die hier in dieser noch an der Außenseite der Filterkerze befindliche Trübe bzw. Schmutzflüssigkeit mit dem Schmutz zum Schlammbablauf hin ausgetragen werden. Bei Entleerung der genannten Filterkammer öffnet der Schwimmer 32 das Belüftungsventil 31. Nach erfolgter Rückspülung kann dann diese Filterkammer wieder mit Trübe aufgefüllt werden, die durch eine Auffüllbohrung in die Filterkammer eingeleitet wird, wobei das schwimmergesteuerte Belüftungsventil 31 wieder schließt, sobald diese Filterkammer mit Spülflüssigkeit wieder gefüllt ist. Die Auffüllbohrung 43 kann beispielsweise als Radialbohrung an der jeweiligen Dichtbuchse 29 angeordnet sein, die die Verbindung zur Filtratkammer 29

herstellt. Diese Anordnung ist möglich, weil der Druck auf der Filtratseite höher ist als der Druck im Rückspülkreislauf. Die abgereinigte und wieder aufgefüllte Filterkammer verbleibt in der Rückspülzone, bis z.B. handgesteuert oder automatisch gesteuert der Drehantrieb 4 den Drehkörper 9 zusammen mit dem gesamten Filtereinsatz um einen weiteren Takt, hier um etwa 90°, weiterdreht und damit die nächstfolgende Filterkammer mit ihrem Filtereinsatz in die Rückspülzone gelangt, während die zuvor rückgespülte Filterkammer mit ihrem Filtereinsatz hierbei aus der Filterzone herausgeführt und wieder in die Filtrierzone gelangt, in der sie zusammen mit den beiden weiteren Filterkammern für den kontinuierlichen Filterbetrieb zur Verfügung steht.

[0021] Fig. 1 läßt erkennen, daß in dem Fußstück 2 des Filtergehäuses 1 eine Beheizungskammer 42 angeordnet werden kann, in die bzw. durch die ein Heizmedium eingeführt bzw. durchgeführt werden kann, um im Bedarfsfall eine Filterbeheizung und damit eine Beheizung der zu filternden Flüssigkeit vornehmen zu können.

[0022] Der erfindungsgemäße Rückspülfilter kann sowohl durch Handbetätigung als auch im vollautomatischen Betrieb arbeiten, auch in einer Kombination von Handbetrieb und vollautomatischen Betrieb, im letztgenannten Fall zweckmäßig durch differenzdruckabhängige und/oder zeitabhängige Steuerung des Drehantriebs und der Rückspülvorrichtung. Bei Verwendung eines pneumatischen Drehantriebs kann ein einfacher Druckluft-Schwenkantrieb vorgesehen werden, der bei seiner Druckluftbeaufschlagung den Drehkörper mit den gesamten Filtereinheiten lediglich um einen Teilschritt dreht, der einem Teilweg der gesamten Umlaufbahn entspricht, bei dem beschriebenen Rückspülfilter mit vier Filterkammern und Filtereinsätzen einem Bogenweg von etwa 90°. Bei der Rückspülung mit Druckluftbeschleunigung der Spülflüssigkeit kann mit einer kurzen Nachblaszeit der Druckluftzuführung in die betreffende Filterkammer gearbeitet werden, um den Schlamm vollständig aus der Filterkammer auszublasen. Nach Abreinigung der Filterkerze wird dann die noch in der Rückspülzone verbleibende Filterkammer, wie beschrieben, wieder aufgefüllt, und zwar entweder mit der über den Filtereinlaß zugeführten Trübe oder mit Filtrat, welches in die zuvor abgereinigte Filterkerze eingeführt wird.

[0023] Es versteht sich, daß die Erfindung aus das vorstehend beschriebene Ausführungsbeispiel nicht beschränkt ist, sondern Änderungen erfahren kann, ohne den Rahmen der Erfindung zu verlassen. Selbstverständlich kann der erfindungsgemäße Rückspülfilter auch mit einer anderen Anzahl an Filtereinsätzen bzw. Filterkammern ausgestattet sein. Insbesondere bei Rückspülfiltern hoher Filterleistungen und entsprechend großer Anzahl an Filterkammern und Filtereinsätzen können auf der gemeinsamen Umlaufbahn auch mehr als nur eine einzige Rückspülzone vorgesehen werden, z.B. zwei Rückspülzonen. Der beschriebene

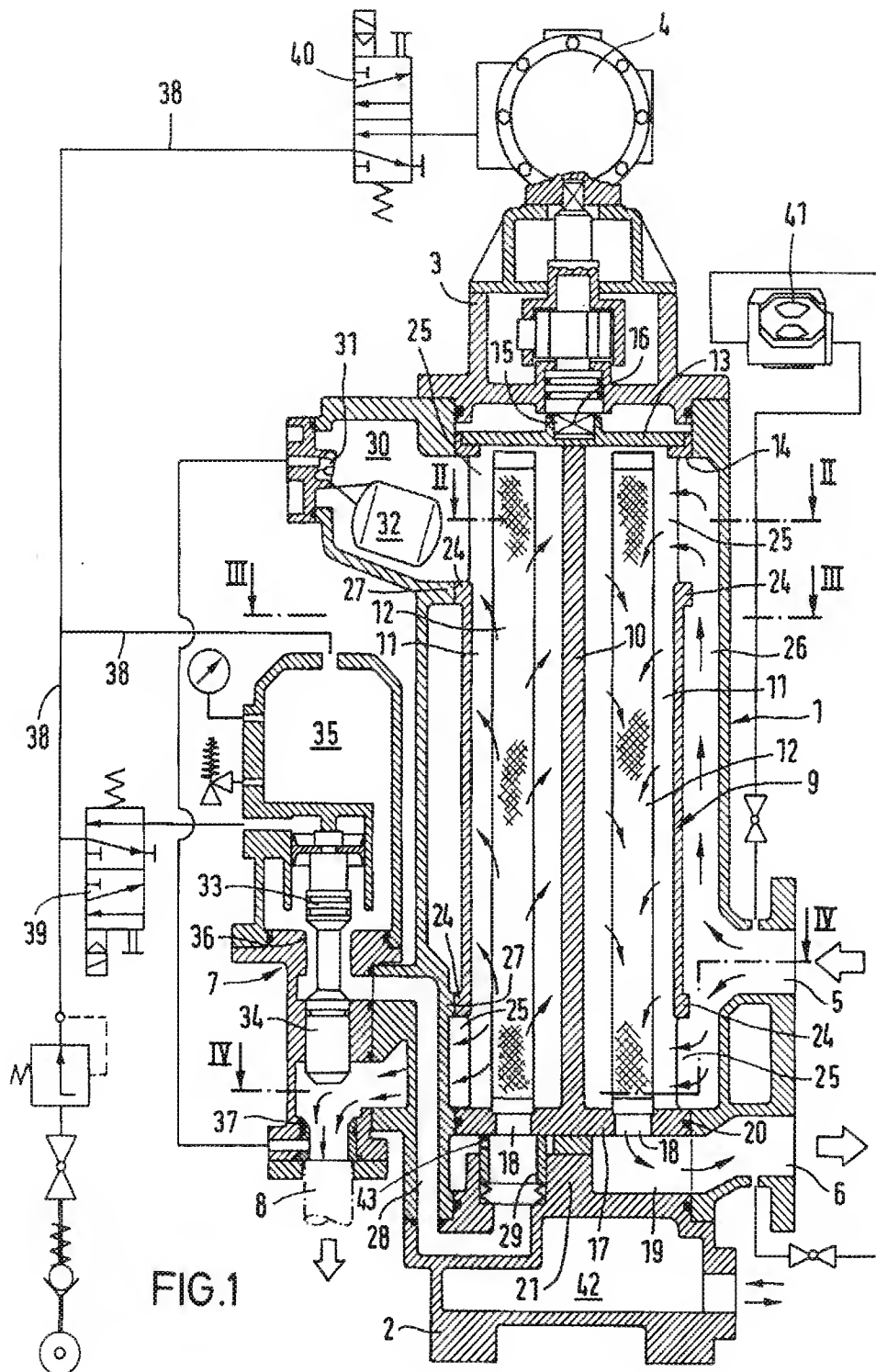
Rückspülfilter kann, wie ersichtlich, sehr kompakt ausgeführt werden. Alle Filtereinsätze lassen sich leicht aus dem Filtergehäuse herausnehmen, indem das Kopfstück abgebaut wird, so daß der gesamte Drehkörper mit den daran angeordneten Filterkammern und Filtereinsätzen nach oben aus dem Filtergehäuse 1 herausgehoben werden kann. Anzumerken ist noch, daß die bei dem vorstehend beschriebenen Rückspülfilter befindliche Rückspülzone in den Fig. 2 und 4 durch den Bogenpfeil Z angegeben ist.

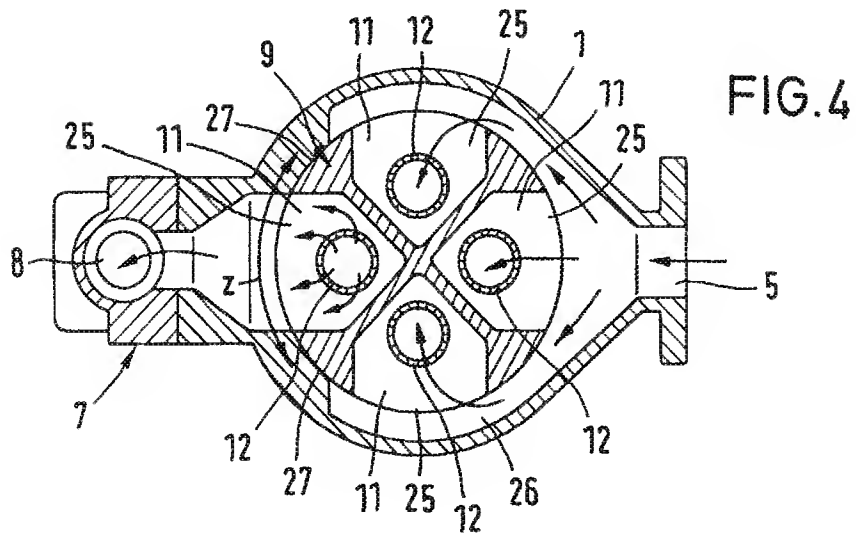
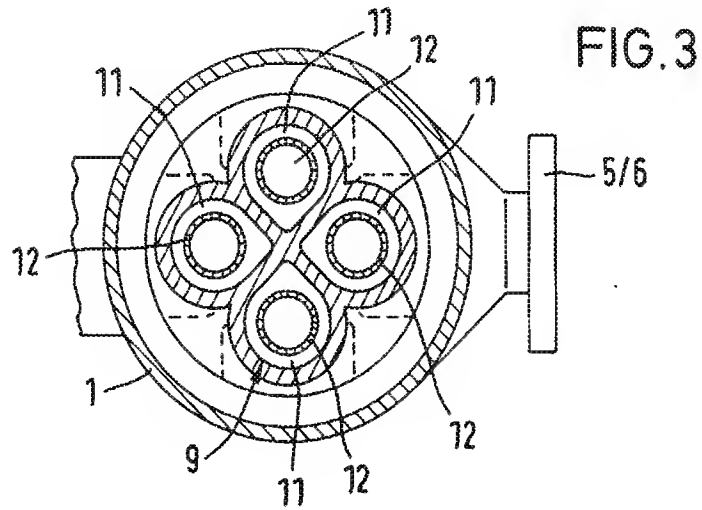
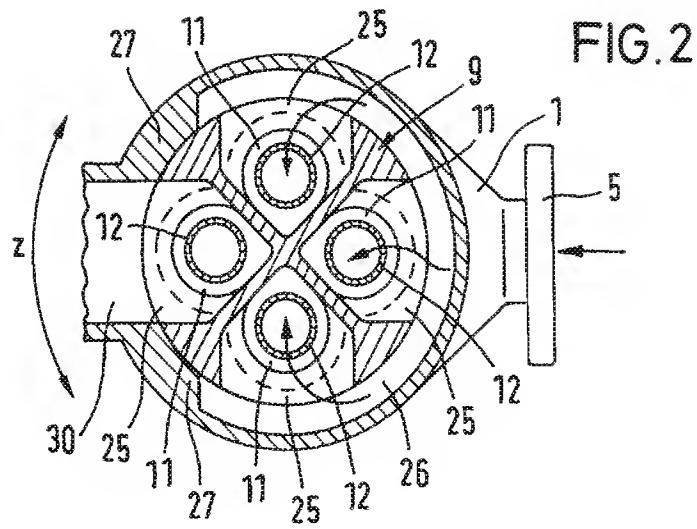
Patentansprüche

1. Rückspülfilter mit einem mit Trübeeinlaß und Filtratauslaß versehenen Filtergehäuse und mehreren darin parallel zueinander angeordneten Filtereinsätzen, wie insbesondere Filterkerzen, die im laufenden Filterbetrieb unabhängig voneinander im Gegenstrom zum Filterbetrieb rückspülbar sind, und mit einer mit Spül- und Schlammablaßventil versehenen Rückspülvorrichtung, mit der die Filtereinsätze einzeln oder gruppenweise in einer vom Filterkreislauf der anderen, im Filterbetrieb stehenden Filtereinsätze abgetrennten Rückspülkammer mit einem Spülmedium rückspülbar und nach erfolgter Rückspülung in den Filterbetrieb zurückstellbar sind, **dadurch gekennzeichnet, daß** die Filtereinsätze (12) mittels eines Stellantriebs (4) auf einer gemeinsamen Umlaufbahn bewegbar sind, die auf mindestens einem Teilabschnitt ihrer Länge eine Rückspülzone (Z) für die Rückspülung des jeweils in dieser in der Rückspülkammer (11) befindlichen Filtereinsatzes (12) bildet.
2. Rückspülfilter nach Anspruch 1, **dadurch gekennzeichnet, daß** die Filtereinsätze (12) jeweils in einer Filterkammer (11) angeordnet sind, wobei die Filterkammern (11) auf dem Teilbereich der Umlaufbahn, auf dem die Filterung erfolgt, an den gemeinsamen Trübeeinlaß (5) und Filtratauslaß (6) des Filtergehäuses (1) und auf dem die Rückspülzone (Z) bildenden Teilabschnitt an den Rückspülkreis angeschlossen sind.
3. Rückspülfilter nach Anspruch 1 oder 2, **dadurch gekennzeichnet, daß** die Filtereinsätze (12) bzw., die sie aufnehmenden Filterkammern (11) an einem gemeinsamen, vom Stellantrieb (4) angetriebenen Filterträger über die Umlaufbahn beweglich angeordnet sind.
4. Rückspülfilter nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, daß** im Filtergehäuse (1) mindestens drei oder vier gemeinsam über die Umlaufbahn bewegliche Filtereinsätze (11) angeordnet sind, denen eine gemeinsame Rückspülzone (Z) zugeordnet ist.

5. Rückspülfilter nach Anspruch 3 oder 4, **dadurch gekennzeichnet, daß** der Filterträger aus einem im Filtergehäuse (1) angeordneten Drehkörper (9) besteht, an dem die Filtereinsätze (12) um dessen Drehachse (10) herum angeordnet sind, wobei der Stellantrieb (4) aus einem den Drehkörper (9) um die Drehachse (10) drehenden Drehantrieb besteht und die Rückspülzone (Z) sich über ein Teilumfang der kreisförmigen Umlaufbahn des Drehkörpers (9) erstreckt. 5
6. Rückspülfilter nach Anspruch 5, **dadurch gekennzeichnet, daß** der Drehkörper (9) mit über seinen Umfang herum in Bogenabständen zueinander angeordneten Filterkammern (11) versehen ist, die jeweils einen Filtereinsatz (12) aufnehmen und zu dem Trübeeinlaß (5) und dem Filtratauslaß (6) sowie mit der Rückspülung dienenden Durchlaßkanälen (25) versehen sind. 10
7. Rückspülfilter nach Anspruch 5 oder 6, **dadurch gekennzeichnet, daß** der Drehkörper (9) mit zu seiner Drehachse parallelen, vorzugsweise in gleichen Bogenabständen zueinander angeordneten, die Filterkammern (11) bildenden Taschen od.dgl. versehen ist. 15
8. Rückspülfilter nach Anspruch 6 oder 7, **dadurch gekennzeichnet, daß** die Filterkammern (11) zumindest an dem einen Ende des Drehkörpers (9), vorzugsweise an dessen beiden Enden zu der Innenseite des Filtergehäuses (1) unter Bildung der Durchflußkanäle (25) offen sind, wobei der Drehkörper (9) in diesem Bereich im Querschnitt etwa sternförmig ausgebildet ist. 20
9. Rückspülfilter nach einem der Ansprüche 5 bis 8, **dadurch gekennzeichnet, daß** die von dem Drehkörper (9) gebildeten Filterkammern (11) auf dem Bogenbereich der Rückspülzone (Z) durch zusammenwirkende, koaxial zur Drehachse (10) des Drehkörpers (9) verlaufende Dichtflächen am Drehkörper (9) und am Filtergehäuse (1) gegenüber dem Filterkreislauf der im Filtersystem befindlichen Filterkammern (11) und den zu dem Trübeeinlaß (5) und dem Filtratauslaß (6) führenden Durchflußkanälen im Filtergehäuse (1) abgetrennt sind. 25
10. Rückspülfilter nach Anspruch 9, **dadurch gekennzeichnet, daß** der Drehkörper (9) im Bereich seiner radialen Durchflußkanäle (25) mit zur Drehachse (10) koaxialen ringförmigen Dichtflächen (24) versehen ist, die nur im Bogenbereich der Rückspülzone (Z) mit innenseitig des Filtergehäuses angeordneten stehenden Gegendichtflächen (27) in Dichtanlage stehen, auf dem sonstigen Umfangsbereich ohne Dichtanlage zur Innenseite des Filtergehäuses (1) sind. 30
11. Rückspülfilter nach Anspruch 10, **dadurch gekennzeichnet, daß** die Gegendichtflächen (27) von sich nur über den Bogenbereich der Rückspülzone (Z) erstreckenden, in Richtung der Drehachse (10) des Drehkörpers (9) axial zueinander versetzten bogenförmigen Gehäuseflächen gebildet sind. 35
12. Rückspülfilter nach einem der Ansprüche 8 bis 11, **dadurch gekennzeichnet, daß** der Drehkörper (9) auf dem Längenbereich, auf dem seine Filterkammern (11) zur Innenseite des Filtergehäuses (1) geschlossen sind, unter Bildung eines mit dem gemeinsamen Trübeeinlaß (5) verbundenen Innenkanals (26) im Radialabstand zur Innenwandung des Filtergehäuses (1) angeordnet ist. 40
13. Rückspülfilter nach einem der Ansprüche 5 bis 12, **dadurch gekennzeichnet, daß** der Drehkörper (9) an seinen beiden Enden mit drehfest an ihm angeordneten Verschlußstücken versehen ist. 45
14. Rückspülfilter nach Anspruch 13, **dadurch gekennzeichnet, daß** das am Ende des Stellantriebs (4) angeordnete, die Filterkammern (11) schließende Verschlußstück als lösbar am Drehkörper angeordnete angeschlossene Kupplungsplatte (13) ausgebildet ist, mit der die Welle des Drehantriebs (4) axial lösbar drehgeschlüssig kuppelbar ist. 50
15. Rückspülfilter nach Anspruch 13 oder 14, **dadurch gekennzeichnet, daß** das am anderen Ende des Drehkörpers (8) angeordnete Verschlußstück als eine Lochplatte (17) ausgebildet ist, die den Träger der aus Filterkerzen bestehenden Filtereinsätze (12) bildet und deren Plattenöffnungen (18) die Verbindung der Innenräume der Filterkerzen mit dem gemeinsamen Filtratauslaß (6) bzw. dem Spülmitteleinlaß herstellen. 55
16. Rückspülfilter nach Anspruch 15, **dadurch gekennzeichnet, daß** die Lochplatte (17) ein Drehlager für den Drehkörper (9) bildet, vorzugsweise in einem Lagerring (23) angeordnet ist, der in einer Lagerfläche (20) des Filtergehäuses dichtend und drehbar gelagert ist. 60
17. Rückspülfilter nach Anspruch 15 oder 16, **dadurch gekennzeichnet, daß** die Lochplatte (17) zwischen dem Trübeeinlaß (5) und dem Filtratauslaß (6) im Filtergehäuse angeordnet ist. 65
18. Rückspülfilter nach einem der Ansprüche 1 bis 17, **dadurch gekennzeichnet, daß** in jeder Filterkammer (11) als Filtereinlaß (12) mindestens eine Filterkerze angeordnet ist. 70
19. Rückspülfilter nach einem der Ansprüche 1 bis 18, **dadurch gekennzeichnet, daß** die Rückspülvor-

- richtung (7) auf dem Bogenbereich der Rückspülzone (Z) außenseitig am Filtergehäuse (1), vorzugsweise leicht lösbar, angeschlossen ist.
20. Rückspülfilter nach einem der Ansprüche 1 bis 19, **dadurch gekennzeichnet, daß** der z.B. pneumatische Drehantrieb (4) an einem das Filtergehäuse (1) kopfseitig verschließenden und lösbar am Filtergehäuse (1) angeordneten Kopfstück (3) angeordnet ist. 5 10
21. Rückspülfilter nach einem der Ansprüche 1 bis 20, **dadurch gekennzeichnet, daß** das Filtergehäuse (1) an seinem dem Drehantrieb (4) gegenüberliegenden Ende durch ein lösbares Fußstück (2) verschlossen ist. 15
22. Rückspülfilter nach Anspruch 21, **dadurch gekennzeichnet, daß** am Fußstück (2) der Filtrat- auslaß (6) angeordnet ist. 20
23. Rückspülfilter nach Anspruch 21 oder 22, **dadurch gekennzeichnet, daß** das Fußstück (2) mit einer von einem Heizmedium durchströmten Beheizungskammer (42) versehen ist. 25
24. Rückspülfilter nach einem der Ansprüche 1 bis 23, **dadurch gekennzeichnet, daß** der jeweils in der Rückspülzone (Z) befindliche Filtereinsatz (12) durch ein druckgasbeaufschlagtes Medium, insbesondere Spülfiltrat und/oder Trübe, rückspülbar ist. 30
25. Rückspülfilter nach Anspruch 24, **dadurch gekennzeichnet, daß** der Rückspülvorrichtung (7) ein Druckgasspeicher (35) zugeordnet ist und das Spülventil in seiner Spülschaltstellung die Druckgaskammer (35) mit der in Spülposition befindlichen Filterkammer (11) verbindet und das Schlammablaßventil (34, 37) die Verbindung dieser Filterkammer (11) mit dem Schlammablauf (8) herstellt. 35 40
26. Rückspülfilter nach Anspruch 24 oder 25, **dadurch gekennzeichnet, daß** die Druckgaszuführung zur Filtratrückspülung des in der Rückspülzone (Z) befindlichen Filtereinsatzes (12) bzw. der ihn aufnehmenden Filterkammer (11) an dessen bzw. deren Innenraum angeschlossen ist, wobei die betreffende Filterkammer mit einem Schlammablauf (8) verbunden ist. 45 50
27. Rückspülfilter nach einem der Ansprüche 24 bis 26, **dadurch gekennzeichnet, daß** der der Druckgaszuführung dienende Kanal (28) im Fußstück (2) angeordnet und vorzugsweise über eine gegen die Lochplatte (17) elastisch anstellbare Dichtbuchse (29) mit der in die Filterkerze führenden Plattenöff- 55
- nung (18) dichtend verbunden ist.
28. Rückspülfilter nach einem der Ansprüche 24 bis 27, **dadurch gekennzeichnet, daß** das Filtergehäuse (1) an dem der Druckgaszuführung gegenüberliegenden Ende mit einem mit der in der Spülzone liegenden Filterkammer (11) verbundenen Kopfraum (30) mit schwimmergesteuertem Belüftungsventil (31) aufweist.
29. Rückspülventil nach einem der Ansprüche 1 bis 28, **dadurch gekennzeichnet, daß** der Drehantrieb (4) aus einem gesteuerten Schrittschaltmotor, insbesondere einem pneumatischem Motor, besteht.





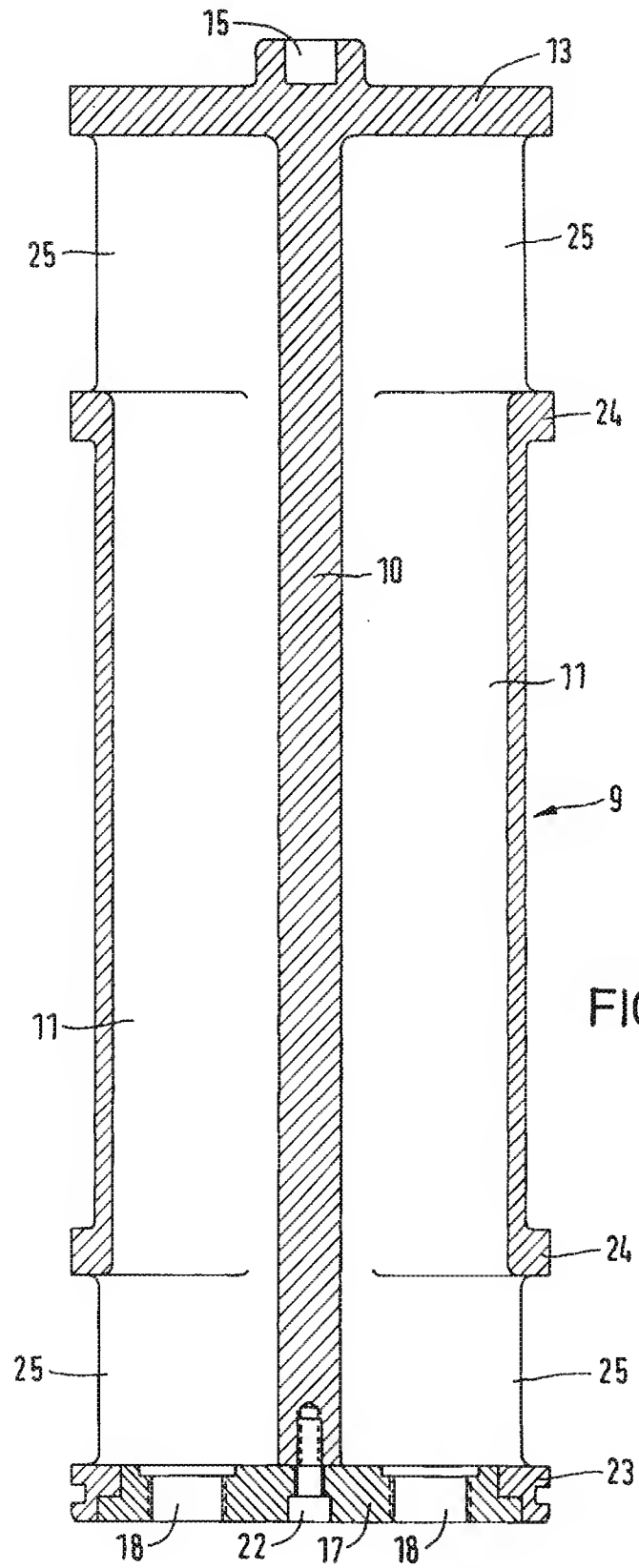


FIG.5



Europäisches
Patentamt

EUROPÄISCHER RECHERCHENBERICHT

Nummer der Anmeldung
EP 98 11 2344

EINSCHLÄGIGE DOKUMENTE			
Kategorie	Kennzeichnung des Dokuments mit Angabe, soweit erforderlich, der maßgeblichen Teile	Betrifft Anspruch	KLASSIFIKATION DER ANMELDUNG (Int.Cl.6)
X	DE 34 05 179 A (DEUTSCHE VERGASER GMBH CO KG) 14. August 1985	1-9, 12, 13, 18, 24	B01D29/11
Y	* Seite 8, Zeile 7 - Zeile 25 *	15-17, 20, 29	B01D29/54
	---		B01D29/66
Y	WO 92 17263 A (MEMTEC AMERICA CORP) 15. Oktober 1992 * Seite 20, Absatz 2; Abbildung 2 *	15-17	

Y	FR 2 128 742 A (BRIEDEN & CO MASCHF K) 20. Oktober 1972 * Seite 7, letzter Absatz; Abbildung 2 *	20, 29	

A	US 2 985 306 A (STATZELL) 23. Mai 1961 * Abbildung 2 *	1-29	

A	FR 1 130 258 A (HERSEY) 4. Februar 1957 * Abbildung 1 *	1-29	

A	WO 96 02371 A (SCHENK FILTERBAU GMBH ; REIJNEN KEES ERIC THEODOOR (DE); ELGHOSAIN) 1. Februar 1996 * Abbildungen 4, 5 *	1-29	

Der vorliegende Recherchenbericht wurde für alle Patentansprüche erstellt			
Recherchenort		Abschlußdatum der Recherche	Prüfer
DEN HAAG		24. September 1998	De Paepe, P
KATEGORIE DER GENANNTEN DOKUMENTE		T : der Erfindung zugrunde liegende Theorien oder Grundsätze E : älteres Patentdokument, das jedoch erst am oder nach dem Anmeldedatum veröffentlicht worden ist D : in der Anmeldung angeführtes Dokument L : aus anderen Gründen angeführtes Dokument & : Mitglied der gleichen Patentfamilie, übereinstimmendes Dokument	
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[0001] The invention relates to a back rinsing filter the corresponding type indicated in the preamble of Claim 1.

[0002] Back rinsing filters, which become the filtration of liquids and preferred of fuel and lubricating oils used, are for a long time in various embodiments known and in large quantities in the use. They exhibit two or more at a common filter basic housing standing disposed filter chambers, the filter inserts, mostly in the form of Filterkerzen, take up (DE 18 01 441 C3, EP 0,361,217 B1, EP 0,656,223 A1). The arrangement regular is so met that the filter chambers with the filter inserts located herein can be rewound independently in countercurrent to the filter enterprise, while the other filter chambers are further in the filter enterprise.

[0003] In addition, rewinding of the single filter chambers and the filter inserts made generally with the help of the slurry, thus the dirt liquid, located required to cleaning purposes, in them, can take place with the help of the filtrate already filtered or by slurry and filtrate, whereby the contaminants rinsed out in the back rinsing enterprise become discharged over an expiration of mud with associated mud drain valve. For the single back flushing of the filter chambers the known back rinsing filters exhibit one by hand or time or differential pressure-controlled rewinding assembly with a back rinsing valve, inside the filter housing and/or. the filter chambers the supporting basic housing disposed is and in the compound between the filter chamber located in the back rinsing position and the expiration of mud is. In the practice preserved have themselves back rinsing systems with rotary valves, with those rewinding supporting by an introduced compressed gas, mostly compressed air, made, which when opening a compressed gas valve the back rinsing liquid suddenly accelerated located in to backrinse the filter chamber, so that the Abreinigungsprozess of the back rinsing medium improving impact effect becomes achieved (EP 0,361,217 B1).

[0004] With the known multi-chamber back rinsing filters the rewinding assembly is inside the filter chambers the supporting filter basic housing at heavy accessible location. In addition it concerns with the known back rinsing filters relatively large and expensive building filter apparatuses.

[0005] Object of the invention is it above all, a back rinsing filter for the filtration of liquids, preferably from fuel, lubricating oils u.dgl., to create opposite the conventional back rinsing filters more compact, more uncomplicated to maintain and as also as possible simpler to build can.

[0006] This object becomes according to invention dissolved by the fact that the filter inserts are more movable by means of a control drive in the filter housing on a common orbit, which in each case forms a back rinsing zone for rewinding on at least a section of its length in this filter insert located in the back rinsing chamber. The filter inserts of the back rinsing filter are convenient in each case in own filter chamber disposed, whereby the filter chambers on the portion of the orbit,
 ▲ top on which the filtration made, to which common cloudy inlet and the filtrate discharge opening of the filter housing are and on that the back rinsing zone formed section to the back rinsing circle connected. The single filter inserts and/or. they the female filter chambers are favourable-prove movable disposed at a common filter support propelled by the control drive over the orbit.

[0007] Different of known and conventional back rinsing filters, single with which the filter chambers are more switchable fixed at the filter housing disposed and for rewinding by Ventilbetätigung on back rinsing enterprise, are with according to invention back rinsing filters of filter inserts formed, convenient in each case in own filter chamber disposed single filters in common filter housings so stored that it with the help of the control drive over an orbit moved to become to be able, in which at least one back rinsing zone is in that the Abreinigung of the respective filter insert in the back rinsing enterprise made. The rotating and/or. Path exhibits itself thus on a partial length a back rinsing zone, in that in each case the filter located herein and/or. Back rinsing chamber with the filter insert disposed therein is abgereinigt by the filter cycle of the other filter units separated in the back rinsing enterprise, standing in the filter enterprise. This embodiment of the back rinsing filter a possible compact construction the same and possible also building simplifications, since all filter units can be inside the common filter housing. At the same time also the rewinding assembly with the rewinding and mud drain valve outside at the filter housing can be cultivated, whereby likewise building simplifications and also advantages result concerning the maintenance of the rewinding assembly and its valves. For a possible vent that the filter inserts female filter chambers after made rewinding can become for all filter units a common vent valve provided, in particular in the known embodiment as float-controlled vent valve. Building and assembly simplifications can be reached also by the fact that become accessible by opening the filter housing all filter inserts.

[0008] In preferred embodiment the arrangement is met so that the single filter units formed of the filter inserts are movable with the help of the control drive on an arcuate orbit, on which at least one back rinsing zone is, although in principle also a design of the back rinsing filter is possible, with which the single filter units over an orbit moved different of the circular path becomes with the back rinsing filter according to invention. With arcuate orbit the filter support can exist disposed rotary body, disposed at which the filter inserts are around its axis of rotation, preferably in same angular distances to each other, of in the filter housing, whereby the control drive consists the rotary body of a rotary drive rotary

around the axis of rotation and the back rinsing zone itself over a partial extent of the circular orbit of the rotary body extended. Preferably here the rotary body is provided also over its periphery around in elbow distances disposed filter chambers to each other, which take up a filter insert in each case and also to the cloudy inlet and the filtrate discharge opening of the filter housing as well as is provided with rewinding serving the flow passages. The rotary body is convenient also parallel to its axis of rotation, the filter chambers formed pockets of. provided. The filter chambers are at least to end of the rotary body, preferred however formation of the flow passages open bottom at the two end regions the same to the inside of the filter housing, whereby the rotary body can be in this end region in the cross section star shaped formed. Further the arrangement convenient is met in such a way that in the filter enterprise of the back rinsing filter the filter inserts and/or. Filterkerzen by the dirt liquid supplied over the cloudy inlet of the filter housing to be from the outside inward flowed through, whereby the dirt liquid becomes convenient in the two end regions the filter chambers and thus the Filterkerzen supplied, while the filtrate from the interiors of the filter inserts and/or. Filterkerzen the common filtrate discharge opening of the filter housing derived becomes. Favourable arrangement characteristics of the back rinsing filter according to invention in the preferred embodiment with around its axis of rotation rotatable rotary body are in the single claims indicated, on which respect can become taken here.

[0009] Generally it is sufficient, if becomes provided in each filter chamber of the back rinsing filter as filter insert only a single Filterkerze, although naturally also the arrangement several, parallel Filterkerzen is possible. For rewinding at the back rinsing filter according to invention convenient with an compressed gas-applied rinsing medium one works, as this actual known is. The flushing device a compressed gas storage chamber associated can be, those by actuation of the flush valve with in the back rinsing position the located, here the back rinsing chamber formed filter chamber connected becomes, so that rewinding will become with the help of the filtrate located in this chamber and/or the slurry by jerky compressed air admission bottom good Abreinigung of the filter insert effected and therefore the contaminants with opened mud drain valve over the expiration of mud discharged. The flush valve and the mud drain valve as well as the compressed gas storage chamber can form a compact assembly, which, as mentioned, can become outside mounted releasable at the valve housing.

[0010] Other favourable arrangement characteristics of the back rinsing filter according to invention are in the single claims indicated and become subsequent more near explained in connection with in the drawing the illustrated embodiment. Show in the designs:

Fig. 1 a back rinsing filter according to invention with outside mounted rewinding assembly in the axial section;
Fig. 2, 3 and 4 in each case the back rinsing filter after Fig. 1 in a cross section after line II-II, III III, IV-IV of the Fig. 1.
Fig. 5 in the longitudinal section the rotary body of the back rinsing filter according to invention without filter inserts.

[0011] To understand the invention respect taken becomes on the documents specified to the state of the art initially, in particular the EP 0,361,217 B1.

[0012] Into the Fig. 1 to 4 back rinsing filters shown exhibits an approximated cylindrical filter housing 1, which carries 2 at the foot releasable connected Fusstück and at the head with Flanschverschraubung likewise releasable connected header 3, which forms the carrier of a control drive in shape of a rotary drive 4. At the filter housing 1 are in the bottom portion at a housing flange the filter and/or. Cloudy inlet 5 and in relatively dense distance under it the filtrate discharge opening 6 disposed. At the opposite side the outside rewinding assembly is 7 releasable and replaceable mounted at the filter housing 1, which is thus good accessible disposed at the outside of the filter housing. The expiration of mud of the rewinding assembly 7 is in Fig. 1 with 8 referred.

[0013] Inside the filter housing 1 a rotary body 9 is around its longitudinal axis 10, which coincides with the longitudinal axis of the filter housing 1, rotatably disposed as filter support, so that it can become rotated gradual in the filter housing 1 during the filter enterprise with the help of the rotary drive 4. The rotary body 9 exhibits several, here four filter chambers 11 disposed to same extent to each other on its periphery, which take up a filter insert 12 in each case to shape of a Filterkerze, whereby the parallel to each other and to the axis of rotation of 10 disposed filter inserts and/or. Filterkerzen essentially over the full height of the rotary body extend. The rotary body 9 is provided at its two ends with one drehfest at it disposed endplate in each case, that the filter chambers 11 covered grouped around the axis of rotation 10. Those consists the endplate located at the upper end of the rotary body 9 the filter chambers 11 locks here and those, as of Fig of a releasable clutch plate 13 fixed at the rotary body. 1 more recognizable, e.g. by screw connection of releasable at a bearing ring 14 disposed is, which pushes away and with the rotational movement of the rotary body leads in a cylindrical bearing bore at the head end of the filter housing 1. The rotary body 9 clutch plate 13 closing here central is with a clutch opening out of round 15 open to the disk top side provided, in which a Kupplungszapfen formed as a multi-Kant sets 16, which is on the output shaft of the rotary drive, whereby the propulsive turningconclusive clutch between rotary drive and rotary body becomes prepared. By this clutch connection will the assembly and disassembly the rotary drive 4 of the supporting header 3 facilitated and the possibility provided to take the rotary body out upward above 9 with the filter inserts 12 of the filter housing 1 and/or. to begin from above into this.

[0014] At the other one, bottom end of the rotary body drehfest disposed endplate consists of a perforated plate 17, which is at the rotator end of fixed and exhibits on a common pitch circle from threaded bores existing disk openings 18, into those the single filter inserts and/or. Filterkerzen 12 with their foot end provided with an external thread are screwed in, whereby the interiors of the Filterkerzen at the disk openings are 18 2 connected with a common filtrate chamber 19 at the underlying Fusstück, which exhibits the filtrate discharge opening 6 of the back rinsing filter. The circular perforated plate 17 is central on a rising foot camp 21 of the Fusstücks 2 rotatable supported, at their outer periphery with a peripheral seal in a cylindrical bearing face 20 of the filter housing 1 rotatably mounted and. The perforated plate 7 forms thus the carrier of the filter inserts 12 and serves at the same time for the compound of the interiors of the filter inserts with the common filtrate chamber 19 and thus the filtrate discharge opening 6 of the back rinsing filter, whereby the perforated plate serves at the same time the turning misalignment of the rotary body 9 in the filter housing 1. Different one from the embodiment to Fig. 1 can in accordance with Fig. 5 the perforated plate 17 also 9 connected its and at their periphery in a solid bearing ring 23 held, connected releasable by axial screw connection 22 with the rotary body, with the bottom end of the rotary body 9 its, which is in the annular bearing face 20 of the filter housing rotatably mounted. When assembly assembling the rotary body with the perforated plate 17 between the cloudy inlet 5 is and the filtrate discharge opening 6.

[0015] The axial filter chambers 11 of the rotary body 9 are in each case closed over their largest prolonged range in circumferential direction, become thus over the larger prolonged range of the Filterkerzen of tubular pockets od.dgl. formed, which run out at bearing rings 24, so that between these bearing rings and the clutch plate 13 and/or. the perforated plate 17 passage openings 25 formed open to the inner extent area of the filter housing 1 become, which make the compound of the filter chambers 11 with the common cloudy inlet 5 in the filter enterprise on the filter side. From Fig. 1 is more recognizable that on the prolonged range, at which filter chambers are 11 over its whole periphery closed, which are appropriate for arcuate outer delimitations of the filter chambers in a radial distance to the inner wall of the filter housing 1, so that here on the extent range, on which in the filter enterprise the filtration made becomes, a ringsegmentförmiger channel 26 between that housing wall of the filter housing 1 and the rotary body formed, which manufacture the compound of the cloudy inlet 5 with standing in each case the filter inserts in the filter enterprise to the passage openings 25 disposed at the upper and bottom ends of the filter chambers.

[0016] Filter inserts 12 disposed in the filter chambers 11 at the rotary body the 9 in parallel arrangement are more movable to each other by rotational movement of the rotary body 9 with the help of the rotary drive 4 on an arcuate orbit, which forms a back rinsing zone for rewinding located in each case the filter chamber 11 in this back rinsing zone, which forms here a back rinsing chamber, which in relation to the filter cycle between the cloudy inlet 5, which is in the filter enterprise standing filter chambers 11 and the filtrate discharge opening 6 separated and sealed on at least a section of its arc length. This made arcuate section of the arcuate orbit by, the fact formed on that the back rinsing zone that on this section the filter chamber located in the back rinsing zone 11 by the circumferential bearing rings 24 at ringsegmentförmigen back support-flat 27 supports sealing and for turningmovable, so that thereby the fluid communication becomes the ringsegmentförmigen channel 26 and over these the cloudy inlet 5 and the filtrate discharge opening 6 closed. In addition the filter chamber located in the back rinsing zone is 11 at their underside opposite the filtrate chamber 19 and the filtrate discharge opening 6 at the Fussstück 2 sealed. The Filterkerze located in the back rinsing zone is here 2 connected to a back rinsing channel 28 in the Fussstück; this ends below the disk opening 18, connected at which the Filterkerze located in the back rinsing zone is by screw connection. The arrangement is in such a way met accordingly with the back rinsing filter shown that of the four filter chambers and/or. the four filter inserts of 12 in each case three filter inserts in the filter enterprise are, while the fourth filter chamber with the filter insert of the back rinsing position located therein is within the back rinsing zone Z, approximately over a quarter of the circular orbit of the rotary body 9 in the filter housing 1 extended (Fig. 2). The aforementioned back rinsing channel 28 ends at the Fussstück 2 in an axial bore, is 29 axial-relocatable disposed in which a spring loaded dense socket, those by the spring force against the underside of the perforated plate 17 pressed becomes sealing and with it the disk opening 18, at which the Filterkerze located in the back rinsing zone is, opposite the perforated plate seals, so that a back rinsing cycle independent of the filter cycle becomes formed. At the upper end the filter housing 1 a radial housing extension exhibits, which an headspace 30 forms, which stands over the Durchflussöffnung 25 of the filter chamber 11 with this, located in the back rinsing zone, in compound and is at that an actual known vent valve 31, which by a float 32 controlled disposed in the headspace is, as this known actual with back rinsing filters is.

[0017] In the lower end region of the filter chamber 11 located in the back rinsing zone these 8 connected over the here disposed Durchflussöffnung 25 and an associated opening is in the wall of the filter housing 1 upon the rewinding assembly 7 and their expiration of mud.

[0018] The 1 rewinding assembly 7 mounted outside on the partial extent range of the back rinsing zone at the filter housing a combined rewinding and mud drain valve points to with both over to piston shaft integral connected valve bodies 33 and 34, whereby the valve body 33 with it the associated valve seat 36 a compressed gas and/or. Druckluftventil forms, which is in a compound 28 disposed between compressed gas memory disposed at the rewinding assembly 7 35 with the back rinsing channel, which stands over the respective opening in the perforated plate 17 with the interior of the Filterkerze located in the back rinsing position. The valve body 34, whose valve seat with 37 referred is, forms the mud drain valve and steers thus in the back rinsing enterprise the expiration of mud 8. The compressed gas memory 35 is to its charge with the compressed gas and/or. the compressed air to a compressed gas and/or. Admission of compressed air system 38 with associated control valve 39 connected. To the same compressed gas and/or. Compressed air system 38 is over a control valve 40 as compressed gas and/or. Pneumatic motor formed rotary drive 4 connected. In the illustrated embodiment the two control valves 39 and 40 consist in each case of a switching valve, which is more controllable both by hand and electromagnetic, in order to manufacture and close the compressed gas connections.

[0019] In Fig. 1 indicated is a differential pressure measuring device 41, which gives in the current filter enterprise the pressures at the cloudy inlet to 5 and at the filtrate discharge opening 6 detected and from the determined pressure values the respective switching signal to the control, so that with a predetermined differential pressure, which is determining for the degree of pollution of the filter units, the rotary drive 4 over the control valve 40 activated and is kept turning thus the rotary body 9 with the entire filter insert around a portion in the filter housing 1, in which the next filter chamber with its filter insert arrives into the back rinsing zone and is abgereinigt here.

[0020] In the filter enterprise 11 in each case three filter chambers located on a common elbow extent of approximately 270 DEG are 11 to the common filter cycle connected of the filter chambers disposed in the illustrated embodiment four on a common circular arc, so that the dirt liquid, like in Fig, inflowing over the cloudy inlet 5. 1 by the arrows indicated, in the supply channel 26 from above and from downside over the passage openings 25 into the three filter chambers flows in and within these filter chambers the filter inserts and/or. Filterkerzen from the outside inward flow through, whereby the filtered dirt at the outer surface of the filter inserts becomes deposited. The filtrate flows in the three Filterkerzen downward and over the associated disk openings 18 into the common filtrate chamber 19 and over the filtrate discharge opening 6 from the back rinsing filter, e.g. to a consumer. Simultaneous one to the filter enterprise is rewind the fourth filter chamber 11 with the filter insert 12 in the back rinsing zone, located herein, as this in Fig. 1 likewise by arrows indicated is. The combined rinsing and mud drain valve e.g. become. by compressed air control into the opening position shown brought, in that the compressed gas and/or. the compressed air from the storage space 35 over the opened valve 33 and the back rinsing channel 28 from downside into the Filterkerze mentioned suddenly flows in and the filtrate suddenly accelerated located in this Filterkerze, so that it is outward driven out from the Filterkerze and the outside dirt adherent at the Filterkerze becomes removed. The rinsing filtrate with the dirt becomes then 8 discharged over the lower passage opening 25 and the opened mud drain valve 34, 37 into the expiration of mud, like this in Fig. 1 likewise by

arrows indicated is. Additional one knows here the slurry located in this still at the outside of the Filterkerze by the jerky compressed gas guidance into the filter chamber mentioned and/or. Dirt liquid with the dirt to the expiration of mud to be delivered. In the case of emptying of the filter chamber mentioned the float 32 opens the ventilation valve 31. After made rewinding then this filter chamber can become again with slurry filled, which becomes introduced by a filling up drilling into the filter chamber, whereby the float-controlled ventilation valve 31 closes again, as soon as this filter chamber with flushing liquid is again filled. The filling up drilling 43 can be for example as radial bore at the respective dense socket 29 disposed, which makes the compound to the filtrate chamber 29. This arrangement is possible, because the pressure on the filtrate side is higher as the pressure in the back rinsing cycle. The abgereinigte and again filled filter chamber remains in the back rinsing zone, to e.g. handcontrolled or automatic the controlled rotary drive 4 the rotary body 9 together with the entire filter insert around an other clock, here over about 90, DEG and thus the next filter chamber with its filter insert keeps turning into the back rinsing zone arrived, while the filter chamber with its filter insert, rewound before, arrives here led out from the filter zone and again into the filter zone, in which it together with the two other filter chambers for the continuous filter enterprise is available.

[0021] Fig. 1 shows that can become 42 disposed in the Fussstück 2 of the filter housing 1 a heating chamber, into those and/or. by an heating medium the introduced and/or. performed will can, in order to be able to make if necessary a filter heating and thus an heating of the liquid which can be filtered.

[0022] The back rinsing filter according to invention can work both by manual control and in the fully automatic operation, also in a combination of hand enterprise and fully automatic operation, in the latter case convenient by differential pressure-dependent and/or time-dependent control of the rotary drive and the rewinding assembly. With use of of a pneumatic rotary drive a simple can become compressed air vane drive provided, which turns the rotary body with the entire filter units during its compressed air admission only around an indexing step, which corresponds to a partial way of the entire orbit, with the described back rinsing filter with four filter chambers and filter inserts an elbow way of approximately 90 DEG. At rewinding with compressed air acceleration of the flushing liquid can be worked with a short Nachbiaszeit of the admission of compressed air into the respective filter chamber, in order to blow out the sludge complete from the filter chamber. After Abreinigung of the Filterkerze then the filter chamber, as described, still remaining in the back rinsing zone, becomes again filled, either with the slurry supplied over the filter inlet or with filtrate, which into the Filterkerze abgereinigte before introduced becomes.

[0023] It understands itself the fact that the invention from that described embodiment is not managing limited but experienced knows changes, without leaving the scope of the invention. Of course the back rinsing filter according to invention can also with another number at filter inserts and/or. Filter chambers provided its. In particular with back rinsing filters high filter achievements and corresponding large number at filter chambers and filter inserts also more than only a single back rinsing zone can become provided, e.g. on the common orbit. two back rinsing zones. The described back rinsing filters can, as apparent, very compact performed becomes. All filter inserts can be taken out light of the filter housing, as the header becomes degraded, so that the entire rotary bodies with the filter chambers and filter inserts disposed to it from the filter housing 1 can be lifted out upward. To mark it is still that managing the back rinsing filters located back rinsing zone in the Fig, described with that. 2 and 4 by the elbow arrow Z indicated is.



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1. Back rinsing filters with with cloudy inlet and filtrate discharge opening provided filter housings and several in it parallel to each other disposed filter inserts, how in particular Filterkerzen, which are in the current filter enterprise independently in the countercurrent backrinsable to the filter enterprise, are more movable and with a rewinding assembly, with which the filter inserts single are resetable or by groups in of the filter cycle of the other filter inserts standing in the filter enterprise separated back rinsing chamber with a rinsing medium backrinsable and after made rewinding into the filter enterprise, provided with rinsing and mud drain valve, characterised in that the filter inserts (12) by means of a control drive (4) on a common orbit, those on at least a section of its length a back rinsing zone (Z) for rewinding in each case in this in that Back rinsing chamber (of 11) located filter insert (12) forms.
2. In each case back rinsing filters according to claim 1, characterised in that the filter inserts (12) in a filter chamber (11) disposed are, whereby the filter chambers (11) on the portion of the orbit, on which the filtration made, to which common cloudy inlet (5) and filtrate discharge opening (6) of the filter housing (1) are and on that the back rinsing zone (Z) formed section to the back rinsing circle connected.
3. Back rinsing filters according to claim 1 or 2, characterised in that the filter inserts (12) and/or. they the female filter chambers (11) at a common, of the control drive (4) propelled filter support over the orbit movable disposed are.
4. Back rinsing filters after one of the claims 1 to 3, characterised in that in the filter housing (1) of at least three or four common filter inserts (11), movable over the orbit, disposed are, which are a common back rinsing zone (Z) associated.
5. Back rinsing filter according to claim 3 or 4, characterised in that of the filter supports from one in the filter housing (1) disposed rotary body (9) exists, disposed at which the filter inserts (12) are around its axis of rotation (10) around, whereby the control drive (4) consists the rotary body (9) of a rotary drive rotary around the axis of rotation (10) and the back rinsing zone (Z) itself over a partial extent the circular orbit of the rotary body (9) extended.
6. Back rinsing filter according to claim 5, characterised in that of the rotary bodies (9) also over its periphery around in elbow distances disposed filter chambers (11) to each other is provided, which take up a filter cartridge (12) in each case and to the cloudy inlet (5) and the filtrate discharge opening (6) as well as with rewinding serving Durch-laschanäle (25) are provided.
7. Back rinsing filters according to claim 5 or 6, characterised in that of the rotary bodies (9) also to its axis of rotation parallel, preferably in same elbow distances to each other disposed, the filter chambers (11) formed pockets od.dgl. is provided.
8. At least back rinsing filters according to claim 6 or 7, characterised in that the filter chambers (11) to end of the rotary body (9), preferably at its two ends to the inside of the filter housing (1) bottom formation of the flow passages (25) open are, whereby the rotary body (9) is in this range in the cross section star shaped formed.
9. Back rinsing filters after one of the claims 5 to 8, characterised in that the filter chambers (11) on the elbow range of the back rinsing zone (Z), formed of the rotary body (9), by cooperative, coaxial sealing surfaces at the rotary body (9), longitudinal to the axis of rotation (10) of the rotary body (9), and at the filter housing (1) opposite the filter cycle of the filter chambers (11), located in the filter system, and the flow passages in the filter housing (1), leading to the cloudy inlet (5) and the filtrate discharge opening (6), separated are.
10. Rückspülfilter nach Anspruch 9, dadurch gekennzeichnet, dass der Drehkörper (9) im Bereich seiner radialen Durchflusskanäle (25) mit zur Drehachse (10) koaxialen ringförmigen Dichtflächen (24) versehen ist, die nur im Bogenbereich der Rückspülzone (Z) mit innenseitig des Filtergehäuses angeordneten stehenden Gegendichtflächen (27) in Dichtanlage stehen, auf dem sonstigen Umfangsbereich ohne Dichtanlage zur Innenseite des Filtergehäuses (1) sind.
11. Back rinsing filters according to claim 10, characterised in that the Gegendichtflächen (27) of itself only over the elbow range of the back rinsing zone (Z) extending, toward the axis of rotation (10) of the rotary body (9) axial to each other offset arcuate housing-flat formed are.
12. Back rinsing filter after one of the claims 8 to 11, characterised in that of the rotary bodies (9) on the prolonged range, closed on which its filter chambers (11) are to the inside of the filter housing (1), bottom formation one with the common cloudy inlet (5) of connected interior channel (26) in the radial distance to the inner wall of the filter housing (1) disposed is.
13. Back rinsing filter after one of the claims 5 to 12, characterised in that of the rotary bodies (9) at its two ends provided with drehfest endplates disposed at it is.
14. Back rinsing filter according to claim 13, characterised in that at the end of the control drive (4) disposed, the filter

chambers (11) closing endplate as releasable clutch plate (13), connected at the rotator end, formed is, is more releasable turning conclusively domable axial with which the shaft of the rotary drive (4).

15. Back rinsing filter according to claim 13 or 14, characterised in that the endplate than a perforated plate (17), disposed at the other end of the rotary body (8), formed is, those the carrier of the filter inserts (12), existing from Filterkerzen, forms and their disk openings (18) the compound of the interiors of the Filterkerzen with the common filtrate discharge opening (6) and/or. the detergent inlet manufacture.

16. Back rinsing filter according to claim 15, characterised in that the perforated plate (17) a rotary bearing for the rotary body (9) forms, preferably in a bearing ring (23) disposed is, which is in a bearing face (20) of the filter housing sealing and rotatably mounted.

17. Back rinsing filter according to claim 15 or 16, characterised in that the perforated plate (17) between the cloudy inlet (5) and the filtrate discharge opening (6) in the filter housing disposed is.

18. Back rinsing filter after one of the claims 1 to 17, characterised in that in each filter chamber (11) as filter inlet (12) at least one Filterkerze disposed is.

19. Back rinsing filter after one of the claims 1 to 18, characterised in that the rewinding assembly (7) on the elbow range of the back rinsing zone (Z) outside at the filter housing (1), preferably light releasable, connected is.

20. Back rinsing filter after one of the claims 1 to 19, characterised in that e.g. pneumatic rotary drive (4) to the filter housing (1) head-laterally locking and releasable header (3), disposed at the filter housing (1), disposed is.

21. Back rinsing filter after one of the claims 1 to 20, characterised in that the filter housing (1) at its rotary drive (4) opposite end by a releasable Fussstück (2) sealed is.

22. Back rinsing filter according to claim 21, characterised in that at the Fussstück (2) the filtrate discharge opening (6) disposed is.

23. Back rinsing filters according to claim 21 or 22, characterised in that the Fussstück (2) with one of an heating medium flowed through heating chamber (42) are provided.

24. Back rinsing filter after one of the claims 1 to 23, characterised in that in each case the filter insert (12), located in the back rinsing zone (Z), by compressed gas-applied Mediums, in particular rinsing filtrate and/or a slurry, is backrinsable.

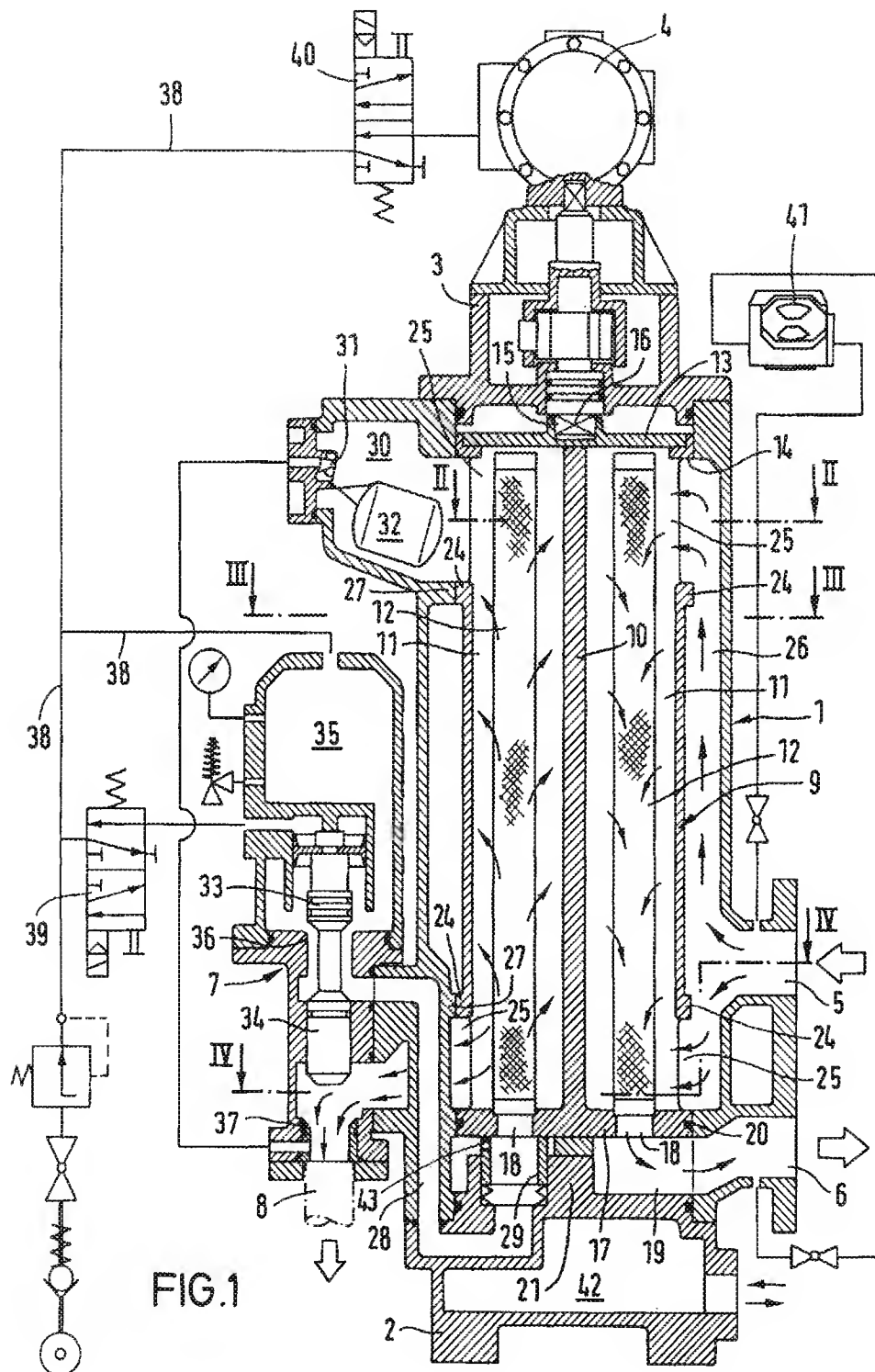
25. Back rinsing filter according to claim 24, characterised in that of the rewinding assembly (7) a compressed gas memory (35) associated is and the flush valve in its rinsing switching position the compressed gas chamber (35) with the filter chamber (11), located in rinsing position, connects and the mud drain valve (34, 37) the compound of this filter chamber (11) upon the expiration of mud (8) manufactures.

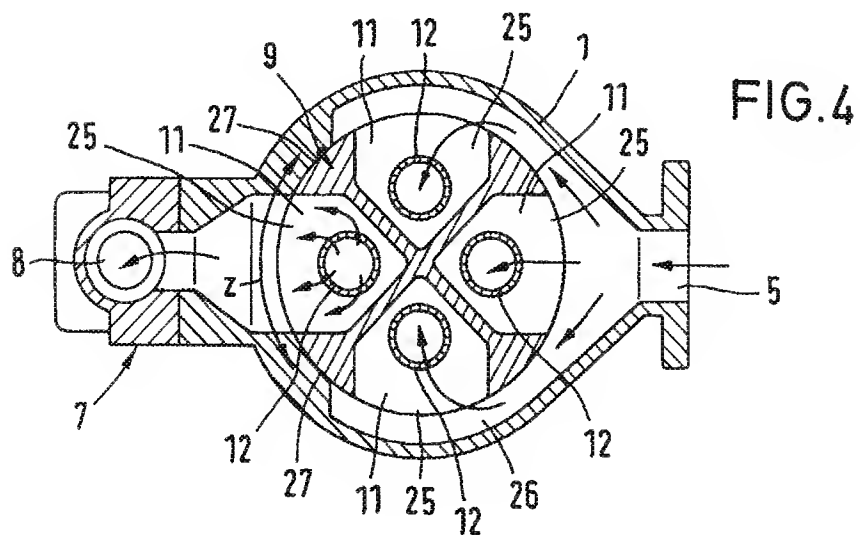
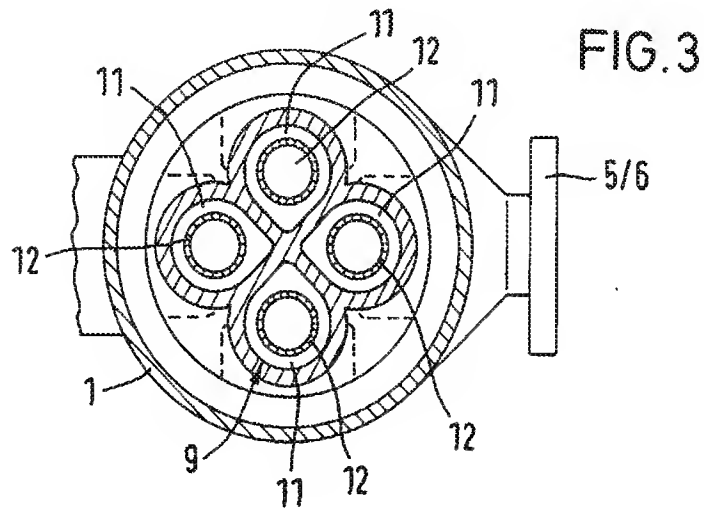
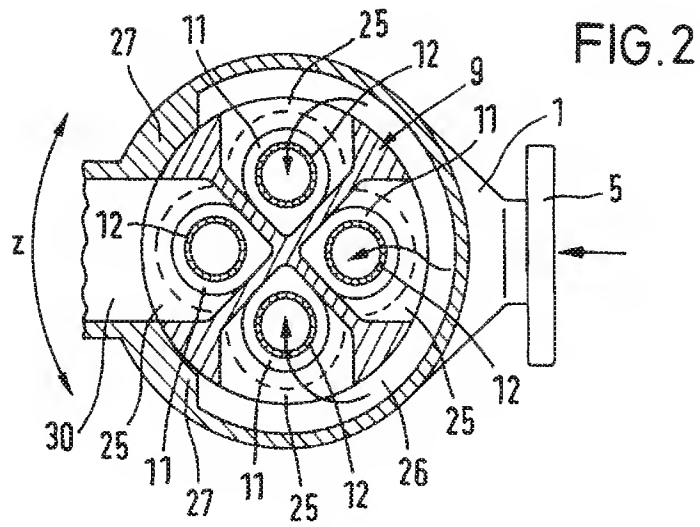
26. Back rinsing filters according to claim 24 or 25, characterised in that the compressed gas supply for the filtrate back flushing of the filter insert (12), located in the back rinsing zone (Z), and/or. it the female filter chamber (11) at its and/or. their interior connected is, whereby the respective filter chamber upon an expiration of mud (8) is connected.

27. Back rinsing filter after one of the claims 24 to 26, characterised in that the compressed gas supply serving channel (28) in the Fussstück (2) disposed and over a employable dense socket (29) with the disk opening (18), leading elastic against the perforated plate (17), into the Filterkerze, connected is sealing preferably.

28. Back rinsing filter after one of the claims 24 to 27, characterised in that the filter housing (1) at that the compressed gas inlet opposite end with an headspace (30) with float-controlled ventilation valve (31), connected with the filter chamber (11), located in the rinsing zone, exhibits.

29. Back rinsing valve after one of the claims 1 to 28, characterised in that the rotary drive (4) of a controlled stepper motor, in particular a pneumatic motor, consists.





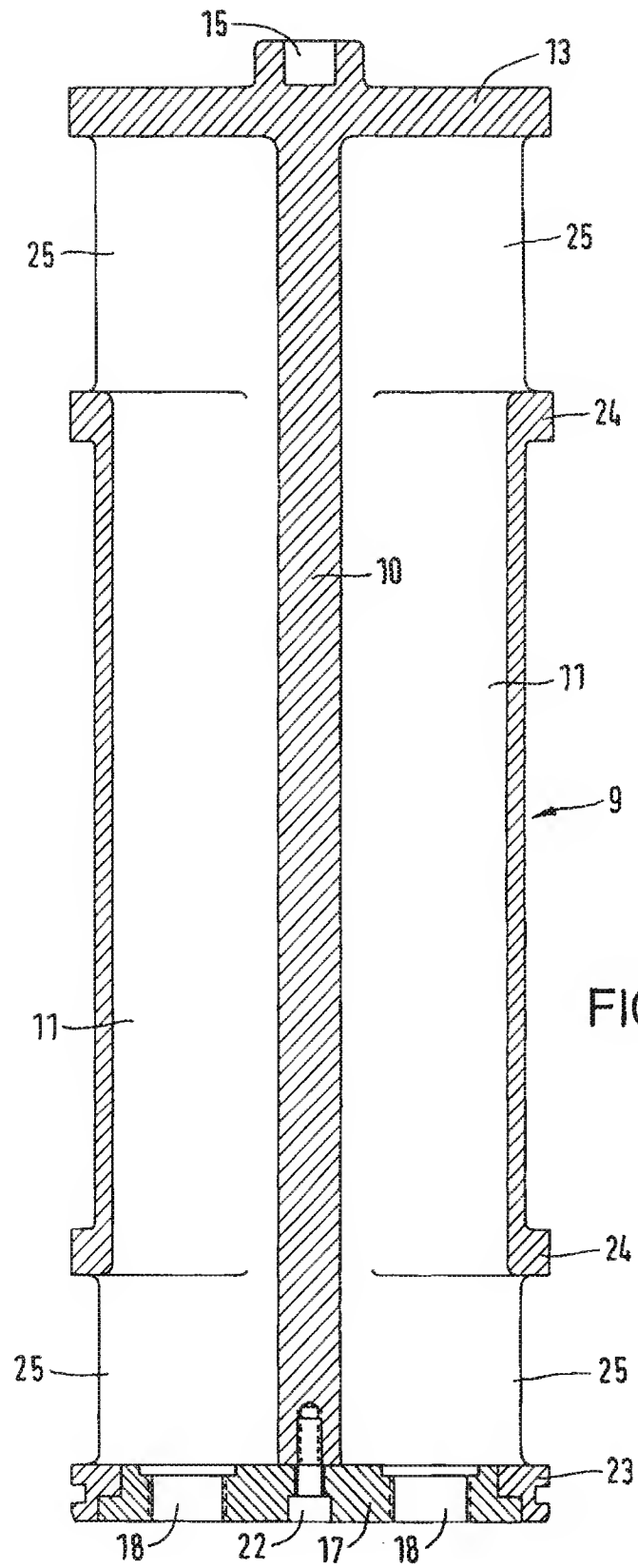


FIG.5

PTO 09-4430

CC = EP
19990310
A1
0900584

BACKWASHING FILTER
[Rückspülfilter]

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[0001]

The present invention pertains to a backwashing filter of the type described in the preamble of Claim 1.

[0002]

Different variations of backwashing filters used for filtering liquids, particularly fuels and lubricating oils, have been known for quite some time and are used in large quantities. They feature two or more filter chambers that are arranged upright on a common filter base housing and accommodate filter inserts that are usually realized in the form of filter candles (DE 18 01 441 C3, EP 0 361 217 B1, EP 0 656 223 A1). In this case, the arrangement is routinely realized such that the filter chambers with the filter inserts situated therein can be backwashed independently of one another in a counterflow referred to the filtering mode while the other filter chambers continue to operate in the filtering mode.

[0003]

The backwashing of the individual filter chambers and of the filter insert situated therein is required for cleaning purposes and usually carried out with the aid of the heavy liquid, i.e., the dirty liquid, but may also be carried out with the aid of the already filtered filtrate or with the aid of the heavy liquid and the filtrate, wherein the contaminants flushed out in the backwashing mode are discharged via a sludge drain with assigned sludge drain valve. In order to realize the individual backwashing of the filter chambers, the known backwashing filters feature a backwashing device with a backwashing valve that is either controlled manually or by means of a time control or a differential pressure control, wherein this

* [Numbers in right margin indicate pagination of the original text.]

backwashing device is arranged in the interior of the filter housing or of the base housing that carries the filter chambers and situated in the connection between the filter chamber that is situated in the backwashing position and the sludge drain. In practical applications, a popular choice is backwashing systems with rotary slide valves, in which the backwashing effect is promoted by introducing a compressed gas that usually consists of compressed air and abruptly accelerates the backwashing liquid situated in the filter chamber to be backwashed when a compressed gas valve is opened such that a percussion effect for improving the cleaning efficiency of the backwashing medium is achieved (EP 0 361 217 B1).

[0004]

In known multichamber backwashing filters, the backwashing device is arranged in the interior of the filter base housing carrying the filter chambers, namely at a location that is difficult to access. In addition, the known backwashing filters consist of relatively large filter apparatuses that also have a complicated design.

[0005]

The primary objective of the invention consists of developing a backwashing filter for filtering liquids, preferably fuels, lubricating oils and the like, which has a more compact design and can be maintained and manufactured in a simpler fashion than conventional backwashing filters.

[0006]

According to the invention, this objective is attained in that the filter inserts can be moved along a common orbit in the filter housing by means of an actuating drive, wherein this common orbit forms a

backwashing zone for backwashing the respective filter insert situated in the backwashing chamber. In this case, it is preferred that the filter inserts of the backwashing filter are respectively arranged in a separate filter chamber, wherein the filter chambers are connected to the common heavy liquid inlet in the section of the orbit in which the filtering takes place, and to the backwashing circuit in the section that forms the backwashing zone. The individual filter inserts or the filter chambers accommodating the filter inserts are advantageously arranged on a common filter carrier that is driven by the actuating drive, namely such that they can be moved along the orbit.

[0007]

In contrast to the known and commonly used backwashing filters, in which the filter chambers are stationarily arranged on the filter housing and can be individually switched into the backwashing mode by means of corresponding valve actuation, the individual filters of the inventive backwashing filter that are formed by the filter inserts and, in particular, respectively arranged in a separate filter chamber are supported in the common filter housing such that an actuating drive can move the filters along an orbit that contains at least one backwashing zone, in which the respective filter insert is cleaned in the backwashing mode. This means that a section of the orbit or motion path features a backwashing zone in which the respective filter chamber or backwashing chamber situated therein, as well as the corresponding filter insert arranged in the respective filter or backwashing chamber, can be cleaned in the backwashing mode separately of the other filter units that operate in the filtering mode. This design of the backwashing filter makes it possible to realize a more compact design, as well as constructive simplifications, because all filter units can be situated in the interior of the common filter housing. The backwashing device with the backwashing and sludge drain valve can also be attached to the outside of the filter housing such that constructive simplifications, as well as advantages with respect to the

maintenance of the backwashing device and its valves, can also be realized in this case. A common ventilating valve, particularly in the form of a conventional float-controlled ventilating valve, may be provided for realizing a possibly required ventilation of the filter chambers that accommodate the filter inserts after the backwashing process. The construction and the assembly can also be simplified if all the filter inserts become accessible when the filter housing is opened.

[0008]

Although it would, in principle, also be possible to realize a backwashing filter in which the individual filter units are moved along an orbit other than a circular orbit, the arrangement in one preferred embodiment of the inventive backwashing filter is realized such that the individual filter units formed by the filter inserts can be moved along an orbit with the shape of a circular arc that contains at least one backwashing zone. If the orbit has the shape of a circular arc, the filter carrier may consist of a rotating body that is arranged in the filter housing and on which the filter inserts are preferably arranged about the rotational axis thereof, namely at identical angular distances from one another, wherein the actuating drive consists of a rotary drive that turns the rotating body about the rotational axis and the backwashing zone extends over part of the circumference of the circular orbit of the rotating body. In this case, the rotating body is preferably provided with filter chambers that are arranged over its circumference within radian distances from one another, wherein said filter chambers respectively accommodate one filter insert and are provided with flow-through channels that [lead to] the heavy liquid inlet and the filtrate outlet of the filter housing and serve for the backwashing process. The rotating body is preferably provided with pockets or the like that form the filter chambers and extend parallel to its rotational axis. In this case, the filter chambers are open toward the inside of the filter housing on at least one end of the rotating body, preferably on both end regions thereof, such that the

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flow-through channels are formed, and wherein the rotating body may be realized with an approximately stellate cross section in this end region. Furthermore, the arrangement is preferably realized such that dirty liquid supplied via the heavy liquid inlet of the filter housing flows through the filter inserts or filter candles from the outside toward the inside in the filtering mode of the backwashing filter, wherein the dirty liquid is preferably supplied to the filter chambers and therefore the filter candles in the two end regions while the filtrate is drained to the common filtrate outlet of the filter housing from the interiors of the filter inserts or filter candles. Advantageous design characteristics of the preferred embodiment of the inventive backwashing filter with a rotating body that can be turned about its rotational axis are disclosed in the individual claims, to which one may refer in this respect.

[0009]

It generally suffices if only one single filter candle is provided as filter insert in each filter chamber of the backwashing filter, but it would naturally also be possible to realize an arrangement of several parallel filter candles. In the inventive backwashing filter, the backwashing process preferably is carried out with a backwashing medium that is conventionally acted upon with compressed gas. In this case, the washing device may be assigned a compressed gas storage chamber that is connected to the respective filter chamber situated in the backwashing position and forms the backwashing chamber in this case by actuating the backwashing valve, wherein the filter insert is backwashed and adequately cleaned with the aid of the filtrate and/or the heavy liquid that is situated in this chamber and acted upon with compressed air, and wherein the contaminants are ultimately discharged via the sludge drain while the sludge drain valve is opened. The backwashing valve and the sludge drain valve, as well as the compressed gas storage chamber, may form one compact structural unit that may be separably attached to the outside of the valve housing as mentioned above.

[0010]

Other advantageous design characteristics of the inventive backwashing filter are disclosed in the individual claims and described in greater detail below with reference to the embodiment illustrated in the drawings. In these drawings:

Figure 1 shows an inventive backwashing filter with a backwashing device attached to the outside thereof in the form of an axial section;

Figures 2, 3 and 4 respectively show the backwashing filter according to Figure 1 in the form of cross sections along the lines II-II, III-III and IV-IV in Figure 1, and

Figure 5 shows the rotating body of the inventive backwashing filter without filter inserts in the form of a longitudinal section.

[0011]

In order to understand the invention, we refer to the initially cited publications with respect to the state of the art, particularly EP 0 361 217 B1.

[0012]

The backwashing filter shown in Figures 1-4 features an approximately cylindrical filter housing 1 that carries a separably connected base section 2 at the base and a head section 3 that is also separably connected by means of a flange joint at the head, wherein said head section forms the carrier for an actuating drive in the form of a rotary drive 4. The filter or heavy liquid inlet 5 is arranged on a housing flange in the lower region of the filter housing 1 and the filtrate outlet 6 is arranged underneath and in relatively close vicinity to this inlet. The backwashing device 7 is separably and exchangeably attached

to the outside of the filter housing 1 on the opposite side therefore is arranged in an easily accessible fashion on the outside of the filter housing. The sludge drain of the backwashing device 7 is identified by the reference symbol 8 in Figure 1.

[0013]

A filter carrier in the form of a rotating body 9 is arranged in the interior of the filter housing 1 such that it can be turned about its longitudinal axis 10 that coincides with the longitudinal axis of the filter housing 1, wherein this rotating body can be incrementally turned in the filter housing 1 during the filtering mode with the aid of the water drive 4. On its circumference, the rotating body 9 features several filter chambers 11, in this case filter chambers that are arranged at identical circumferential distances from one another, wherein these filter chambers respectively accommodate one filter insert 12 in the form of a filter candle, and wherein the filter inserts or filter candles arranged parallel to one another and to the rotational axis 10 essentially extend over the entire height of the rotating body. On its two ends, the rotating body 9 is respectively provided with a closing element that is arranged thereon in a rotationally rigid fashion and covers the filter chambers 11 grouped around the rotational axis 10. The closing element situated on the upper end of the rotating body 9 consists of a coupling plate 13 that is separably fixed on the rotating body and closes the filter chambers 11 in this embodiment, wherein Figure 1 shows that said coupling plate is separably arranged, e.g., screwed, on a bearing ring 14 that is supported and guided in a cylindrical bearing bore on the head end of the filter housing 1 during the rotational motion of the rotating body. The coupling plate 13 that closes the rotating body 9 in this case is provided with a centered, noncircular coupling aperture 15 that is open toward the upper side of the plate and into which a hexagonally designed coupling pin 16 engages, wherein said coupling pin is situated on the output shaft of the rotary drive such that the rotationally rigid drive coupling between the

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rotary drive and the rotating body is produced. This coupling simplifies the installation and removal of the head section 3 carrying the rotary drive 4 and respectively makes it possible to upwardly remove and downwardly insert the rotating body 9 from/into the filter housing 1 together with the filter inserts 12.

[0014]

The closing element arranged in a rotationally rigid fashion on the other, lower end of the rotating body consists of a perforated plate 17 that is rigidly arranged on the end of the rotating body and features plate openings 18 consisting of threaded bores on a common reference circle, wherein the individual filter inserts or filter candles 12 are screwed into said plate openings with their externally threaded base and, and wherein the interiors of the filter candles are connected to a common filtrate chamber 19 on the base section 2 that is situated thereunder and features the filtrate outlet 6 of the backwashing filter. On its outer circumference, the circular perforated plate 17 is rotatably supported in a cylindrical bearing surface 20 of the filter housing 1 by means of a peripheral seal, wherein the perforated plate is centrally supported in a rotatable fashion on a towering base bearing 21 of the base section 2. Consequently, the perforated plate 7 forms the carrier of the filter inserts 12 and simultaneously serves for connecting the interiors of the filter inserts to the common filtering chamber 19 and therefore the filtrate outlet 6 of the backwashing filter, wherein the perforated plate simultaneously serves for realizing the rotational displacement of the rotating body 9 in the filter housing 1. In contrast to the embodiment according to Figure 1, the perforated plate 17 according to Figure 5 may also be separably connected to the rotating body 9 by means of an axial screw joint 22 and held on its outer circumference in a bearing ring 23 that is rigidly connected to the lower end of the rotating body 9 and rotatably supported in the annular bearing surface 20 of the filter housing. In the

assembled state, the rotating body with the perforated plate 17 is situated between the heavy liquid inlet 5 and the filtrate outlet 6.

[0015]

The axial filter chambers 11 of the rotating body 9 are respectively closed in the circumferential direction over the majority of their length, i.e., they are formed by tubular pockets or the like that end at bearing rings 24 over the greater part of their length, wherein through-openings 25 that are open toward the inner circumferential space of the filter housing 1 are respectively produced between said bearing rings on one hand and the coupling plate 13 and the perforated plate 17 on the other hand, and wherein said through-openings produce the connection between the filter chambers 11 and the common heavy liquid inlet 5 on the filtering side in the filtering mode. According to Figure 1, the arc-shaped outer boundaries of the filter chambers are radially spaced apart from the inner wall of the filter housing 1 in the longitudinal region, in which the filter chambers 11 are closed over their entire circumference, wherein a channel 26 with the shape of a ring segment is formed between the housing wall of the filter housing 1 and the rotating body in the circumferential region, in which the filtering takes place in the filtering mode, and wherein said channel produces the connection between the heavy liquid inlet 5 and the filter inserts that are respectively in the filtering mode through the through-openings 25 arranged on the upper and lower ends of the filter chambers.

[0016]

The filter inserts 12 that are arranged parallel to one another on the rotating body 9 in the filter chambers 11 can be moved along an orbit with the shape of a circular arc by turning the rotating body 9 with the aid of the rotary drive 4, wherein said orbit forms a backwashing zone for backwashing the

respective filter chamber 11, in this case backwashing chamber, that is situated in this backwashing zone on at least a section of its arc length, and wherein said filter chamber is separated and sealed relative to the filtering circuit between the heavy liquid inlet 5, the filter chambers 11 that are in the filtering mode and the filtrate outlet 6. On the arc-shaped section of the orbit with the shape of a circular arc that forms the backwashing zone, this is achieved due to the fact that the filter chamber 11 situated in the backwashing zone is supported in a sealing and rotatable fashion on outer bearing surfaces 27 with the shape of ring segments on this section such that the fluid connection to the channel 26 with the shape of a ring segment, as well as to the heavy liquid inlet 5 and to the filtrate outlet 6, is closed. In addition, the filter chamber 11 situated in the backwashing zone is sealed relative to the filtrate chamber 19 and the filtrate outlet 6 on the base section 2 on its underside. At this location, the filter candle situated in the backwashing zone is connected to a backwashing channel 28 in the base section 2; this backwashing channel ends underneath the plate opening 18, to which the filter candle situated in the backwashing zone is connected by means of a screw joint. In the backwashing filter shown, the arrangement is accordingly realized such that three of the four filter chambers or filter inserts 12 are respectively in the filtering mode while the fourth filter chamber with the filter insert accommodated therein is situated in a backwashing position within the backwashing zone Z that extends over approximately one quarter of the circular orbit of the rotating body 9 in the filter housing 1 (Figure 2). On the base section 2, the aforementioned backwashing channel 28 ends in an axial bore, in which a spring-loaded sealing bushing 29 is arranged in an actually displaceable fashion, wherein this sealing bushing is pressed against the underside of the perforated plate 17 due to the spring force and thusly seals the plate opening 18, on which the filter candle situated in the backwashing zone is arranged, relative to the perforated plate such that a backwashing circuit is created that is independent of the filtering circuit. On its upper end, the filter housing 1 features a radial housing widening that forms a head room 30, wherein said head room is

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connected to the filter chamber 11 situated in the backwashing zone via the flow-through opening 25 thereof, and wherein a conventional ventilating valve 31 is situated in said head room and controlled by a float 32 arranged in the head room as it is common practice with backwashing filters.

[0017]

In the lower end region of the filter chamber 11 situated in the backwashing zone, this filter chamber is connected to the backwashing device 7 and its sludge drain 8 via the flow-through opening 25 arranged at this location and an assigned opening in the wall of the filter housing 1.

[0018]

The backwashing device 7 is attached to the outside of the filter housing 1 over part of the circumference of the backwashing zone and features a combined backwashing and sludge drain valve with the two valve bodies 33 and 34 that are integrally connected by means of a piston shaft, wherein the valve body 33 forms a compressed gas or compressed air valve together with the valve seat 36 assigned thereto, wherein this valve is arranged in a connection between a compressed gas accumulator 35 arranged on the backwashing device 7 and the backwashing channel 28 that is connected to the interior of the filter candle situated in the backwashing position via the corresponding opening in the perforated plate 17. The valve body 34, the valve seat of which is identified by the reference symbol 37, forms the sludge drain valve and therefore controls the sludge drain 8 in the backwashing mode. The compressed gas accumulator 35 is connected to a compressed gas or compressed air supply system 38 with an assigned control valve 39 in order to be charged with the compressed gas or the compressed air, respectively. The rotary drive 4 in the form of a compressed gas or compressed air motor is connected to the same compressed gas or compressed air system 38 via a control valve 40. In the embodiment shown,

the two control valves 39 and 40 respectively consist of a switching valve that can be controlled manually, as well as electromagnetically, in order to open and close the compressed gas connections.

[0019]

A differential pressure measuring device 41 indicated in Figure 1 measures the pressures at the heavy liquid inlet 5 and at the filtrate outlet 6 during the filtering mode and delivers the respective switching signal determined on the basis of the pressure values to the control such that the rotary drive 4 is activated by means of the control valve 40 once a predetermined differential pressure is reached that is representative for a certain degree of contamination of the filter units. The rotating body 9 with the entire filter insert is additionally turned in the filter housing by one section, in which the next filter chamber with its filter insert is situated in the backwashing zone and cleaned therein.

[0020]

In the filtering mode, three filter chambers 11 of the four filter chambers 11 arranged on a common circular arc in the embodiment shown respectively lie on a common radian circumference of approximately 270° and are connected to the common filtering circuit such that the dirty liquid introduced via the heavy liquid inlet 5 flows into the three filter chambers from the top to the bottom via the flow-through openings 25 in the supply channel 26 as indicated with arrows in Figure 1 and through the filter inserts or filter candles from the outside toward the inside within these filter chambers, wherein the filtered dirt is deposited on the outer surface of the filter inserts. The filtrate flows downward in the three filter candles and into the common filtrate chamber 19 through the assigned plate openings 18, wherein the filtrate ultimately flows out of the backwashing filter through the filtrate outlet 6, e.g., to a consumer. The fourth filter chamber 11 with the filter insert 12 accommodated therein is backwashed in

the backwashing zone simultaneously with the filtering mode as indicated with arrows in Figure 1. In this case, the combined backwashing and sludge drain valve is moved into the open position shown, e.g., by means of a compressed air control, wherein the compressed gas or the compressed air from the storage space 35 suddenly flows into the aforementioned filter candle from below through the opened valve 33 and the backwashing channel 28 and abruptly accelerates the filtrate situated in this filter candle during this process such that it is driven outward from the filter candle and the dirt adhering to the outside of the filter candle is removed. The backwashing filtrate containing the dirt is subsequently discharged into the sludge drain 8 through the lower flow-through opening 25 and the opened sludge drain valve 34, 37 as indicated with arrows in Figure 1. Due to the abrupt introduction of compressed gas into the aforementioned filter chamber, the heavy liquid or dirty liquid that is still situated on the outside of the filter candle can also be discharged toward the sludge drain together with the dirt. Once the aforementioned filter chamber is emptied, the float 32 opens the ventilating valve 31. After the backwashing has been carried out, this filter chamber can be once again filled with heavy liquid that is introduced into the filter chamber through the filling bore, wherein the float-controlled ventilating valve 31 closes again as soon as this filter chamber is filled with backwashing liquid. The filling bore 43 may be realized, for example, in the form of a radial bore on the respective sealing bushing 29 that produces the connection with the filtrate chamber 29. It is possible to realize this arrangement because the pressure on the filtrate side is higher than the pressure in the backwashing circuit. The cleaned and refilled filter chamber remains in the backwashing zone, e.g., until the rotary drive 4 additionally turns the rotating body 9 by another increment, in this case by about 90°, together with the entire filter insert in order to transport the next filter chamber with its filter insert into the backwashing zone while the previously backwashed filter chamber is transported out of the filtering zone together with its filter

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insert and returned into the filtering zone, in which it is subsequently available for the continuous filtering mode in cooperation with the two other filter chambers.

[0021]

Figure 1 shows that a heating chamber 42 can be arranged in the base section 2 of the filter housing 1, wherein a heating medium can be introduced into or conveyed through this heating chamber in order to heat the filter, if so required, and therefore the liquid to be filtered.

[0022]

The inventive backwashing filter can be operated by means of a manual actuation and in a fully automated mode, as well as a combination of manual actuation and a fully automated mode. In the latter-mentioned instance, the backwashing filter is preferably operated by means of a control of the rotary drive and of the backwashing device that is dependent on the differential pressure and/or time-dependent. When using a pneumatic rotary drive, it is possible to provide a simple compressed air swivel drive that merely turns the rotating body with all filter units by one increment that corresponds to a section of the complete orbit, namely a radial distance of approximately 90° in the described backwashing filter with four filter chambers and filter inserts. During backwashing with an acceleration of the backwashing liquid by means of compressed air, it is possible to supply the compressed air into the corresponding filter chamber with a brief afterblow in order to completely blast the sludge out of the filter chamber. After the filter candle has been cleaned, the filter chamber that still remains in the backwashing zone is refilled as described above, namely either with heavy liquid supplied through the filter inlet or with filtrate introduced into the previously cleaned filter candle.

[0023]

It goes without saying the invention is not limited to the above-described embodiment, but can also be modified without deviating from the scope of the invention. The inventive backwashing filter naturally may also be equipped with a different number of filter inserts or filter chambers, respectively. In backwashing filters with a high filtering capacity and a correspondingly large number of filter chambers and filter inserts, it would be possible, in particular, to provide more than only one backwashing zone along the common orbit, e.g., two backwashing zones. It is quite obvious that the described backwashing filter can be realized in a very compact fashion. All filter inserts can be easily removed from the filter housing by detaching the head section such that the entire rotating body with the filter chambers and filter inserts arranged thereon can be upwardly removed from the filter housing 1. It should also be noted that the backwashing zone of the above-described backwashing filter is indicated with the arc-shaped arrow Z in Figures 2 and 4.

Claims

1. A backwashing filter with a filter housing that is provided with a heavy liquid inlet and a filtrate outlet and several filter inserts such as, in particular, filter candles that are arranged in said filter housing parallel to one another and can be backwashed during the ongoing filtering mode independently of one another in a counterflow referred to the filtering mode, and with a backwashing device that is provided with a backwashing and sludge drain valve in order to backwash the filter inserts with a backwashing medium individually or in groups in a backwashing chamber that is separated from the filtering circuit of the other filter inserts operating in the filtering mode and to return the filter inserts into the filtering mode after the backwashing process, characterized by the fact that the filter inserts (12) can be moved along a common orbit by means of an actuating drive (4), wherein said orbit forms a backwashing zone (Z) for backwashing the respective filter insert (12) situated in the backwashing chamber (11) over at least a section of its length.

2. The backwashing filter according to Claim 1, characterized by the fact that the filter inserts (12) are respectively arranged in a filter chamber (11), wherein the filter chambers (11) are connected to the common heavy liquid inlet (5) and the filtrate outlet (6) of the filter housing (1) in the section of the orbit in which the filtering takes place, and to the backwashing circuit in the section that forms the backwashing zone (Z).

3. The backwashing filter according to Claim 1 or 2, characterized by the fact that the filter inserts (12) or the filter chambers (11) accommodating the filter inserts are arranged on a common filter carrier that is driven by the actuating drive (4) such that they can be moved along the orbit.

4. The backwashing filter according to one of Claims 1-3, characterized by the fact that at least three or four filter inserts that can be jointly moved along the orbit are arranged in the filter housing (1), wherein a common backwashing zone (Z) is assigned to said filter inserts.

5. The backwashing filter according to Claim 3 or 4, characterized by the fact that the filter carrier consists of a rotating body (9) that is arranged in the filter housing (1) and on which the filter inserts (12) are arranged about its rotational axis (10), wherein the actuating drive (4) consists of a rotary drive that turns the rotating body (9) about its rotational axis (10), and wherein the backwashing zone (Z) extends over part of the circumference of the circular orbit of the rotating body (9).

6. The backwashing filter according to Claim 5, characterized by the fact that the rotating body (9) is provided with filter chambers (11) that are arranged over its circumference within radian distances from one another and respectively accommodate one filter insert (12), wherein said filter chambers are provided with flow-through channels (25) that [lead to] the heavy liquid inlet (5) and the filtrate outlet (6) of the filter housing and serve for the backwashing process.

7. The backwashing filter according to Claim 5 or 6, characterized by the fact that the rotating body (9) is provided with pockets or the like that are arranged parallel to its rotational axis, preferably within identical radial distances from one another, and form the filter chambers (11).

8. The backwashing filter according to Claim 6 or 7, characterized by the fact that the filter chambers (11) are open toward the inside of the filter housing (1) on at least one end of the rotating body (9), preferably on both end regions thereof, such that flow-through channels (25) are formed, wherein the rotating body (9) is realized with an approximately stellate cross section in this region.

9. The backwashing filter according to one of Claims 5-8, characterized by the fact that the filter chambers (11) formed by the rotating body (9) are separated from the filtering circuit of the filter chambers (11) situated in the filtering system and from the flow-through channels in the filter housing (1) that lead to the heavy liquid inlet (5) and to the filtrate outlet (6) on the arc section of the backwashing zone, namely by means of cooperating sealing surfaces on the rotating body (9) and on the filter housing (1).

10. The backwashing filter according to Claim 9, characterized by the fact that the rotating body (9) is provided with annular sealing surfaces (24) extending coaxial to its rotational axis (10) in the region of its radial flow-through channels (25), wherein said sealing surfaces are only in sealing contact with upright opposite sealing surfaces (27) arranged on the inner side of the filter housing in the arc section of the backwashing zone (Z), but not in sealing contact with the inner side of the filter housing (1) on the remainder of the circumference.

11. The backwashing filter according to Claim 10, characterized by the fact that the opposite sealing surfaces (27) are formed by arc-shaped housing surfaces that only extend over the arc section of the backwashing zone (Z) and are axially offset relative to one another in the direction of the rotational axis (10) of the rotating body (9).

12. The backwashing filter according to one of Claims 8-11, characterized by the fact that the rotating body (9) is radially spaced apart from the inner wall of the filter housing (1) in the longitudinal region, in which its filter chambers (11) are closed toward the inner side of the filter housing (1), namely such that an inner channel (26) connected to the common heavy liquid inlet (5) is created.

13. The backwashing filter according to one of Claims 5-12, characterized by the fact that both ends of the rotating body (9) are provided with closing elements that are arranged thereon in a rotationally rigid fashion.

14. The backwashing filter according to Claim 13, characterized by the fact that the closing element that is arranged on the end of the actuating drive (4) and closes the filter chambers (11) is realized in the form of a coupling plate (13) that is separably connected to the end of the rotating body and to which the output shaft of the rotary drive (4) can be coupled in a rotationally rigid, but axially separable fashion.

15. The backwashing filter according to Claim 13 or 14, characterized by the fact that the closing element arranged on the other end of the rotating body (8) is realized in the form of a perforated plate

(17) that forms the carrier of the filter inserts (12) in the form of filter candles, wherein the plate openings (18) of said perforated plate respectively produce the connection between the interiors of the filter candles and the common filtrate outlet (6) and the backwashing medium inlet.

16. The backwashing filter according to Claim 15, characterized by the fact that the perforated plate (17) forms a rotary bearing for the rotating body (9) and is preferably arranged in a bearing ring (23) that is supported in a sealing and rotatable fashion in a bearing surface (20) of the filter housing.

17. The backwashing filter according to Claim 15 or 16, characterized by the fact that the perforated plate (17) is arranged in the filter housing between the heavy liquid inlet (5) and the filtrate outlet (6).

18. The backwashing filter according to one of Claims 1-17, characterized by the fact that at least one filter candle is arranged in each filter chamber (11) as filter inlet (12).

19. The backwashing filter according to one of Claims 1-18, characterized by the fact that the backwashing device (7) is attached to the outside of the filter housing (1) in the arc section of the backwashing zone (Z), preferably in an easily separable fashion.

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20. The backwashing filter according to one of Claims 1-19, characterized by the fact that the, e.g., pneumatic rotary drive (4) is arranged on a head section (3) that closes the filter housing (1) on the upper side and is separably arranged on the filter housing (1).

21. The backwashing filter according to one of Claims 1-20, characterized by the fact that the filter housing (1) is closed by means of a separable base section (2) on its end that lies opposite of the rotary drive (4).

22. The backwashing filter according to Claim 21, characterized by the fact that the filtrate outlet (6) is arranged on the base section (2).

23. The backwashing filter according to Claim 21 or 22, characterized by the fact that the base section (2) is provided with a heating chamber (42) through which a heating medium can flow.

24. The backwashing filter according to one of Claims 1-23, characterized by the fact that the respective filter insert (12) situated in the backwashing zone (Z) can be backwashed by means of a medium that is acted upon with compressed gas, particularly backwashing filtrate and/or heavy liquid.

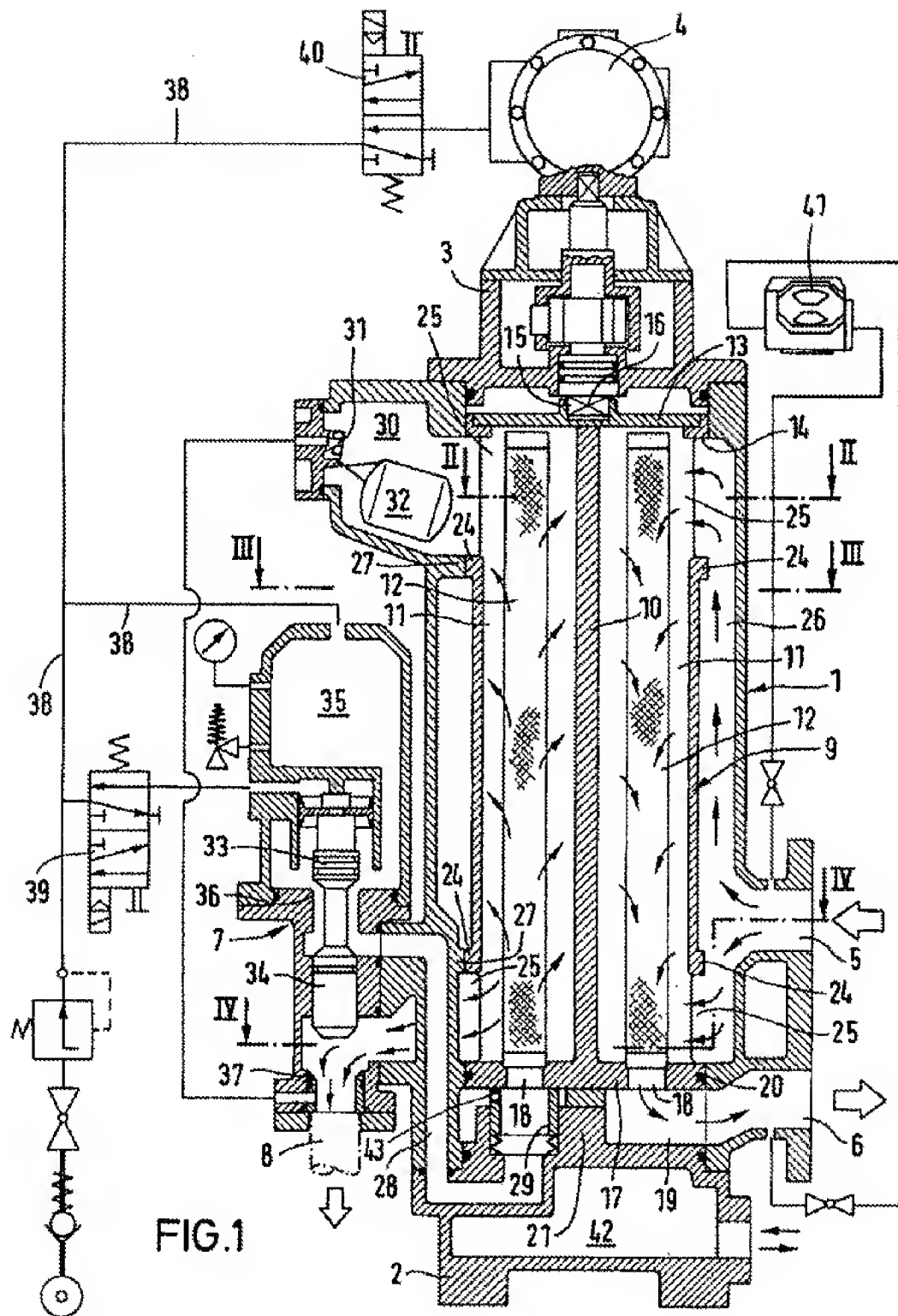
25. The backwashing filter according to Claim 24, characterized by the fact that a compressed gas accumulator (35) is assigned to the backwashing device (7) and the backwashing valve connects the compressed gas chamber (35) to the filter chamber (11) situated in the backwashing position when the backwashing valve is switched into the backwashing position, wherein the sludge drain valve (34, 37) produces the connection between this filter chamber (11) and the sludge drain (8).

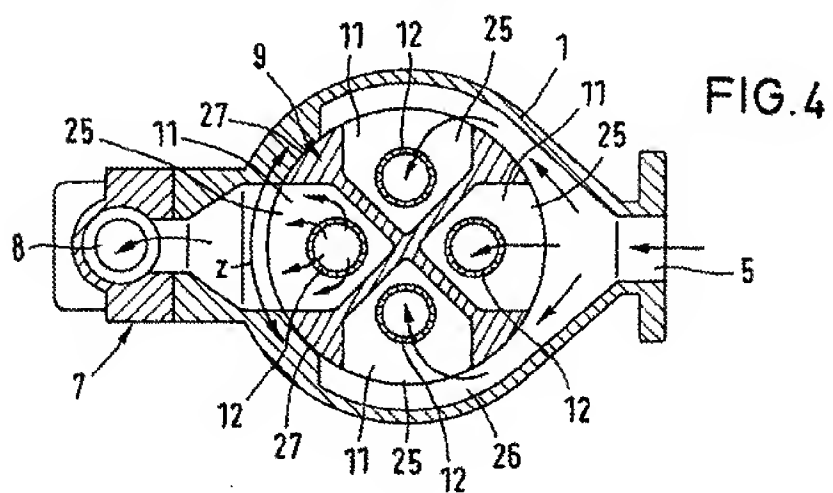
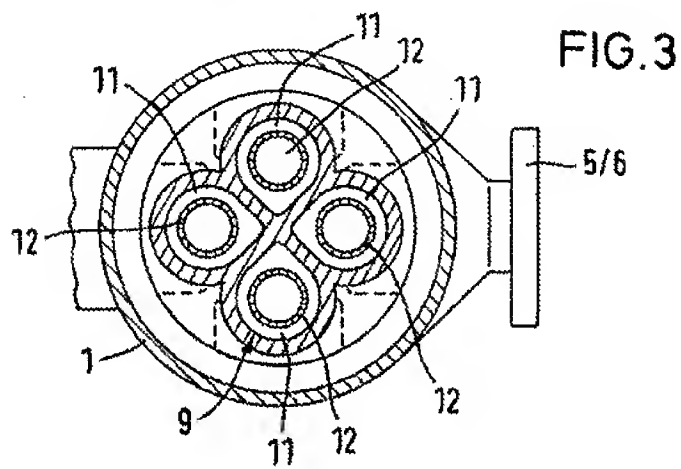
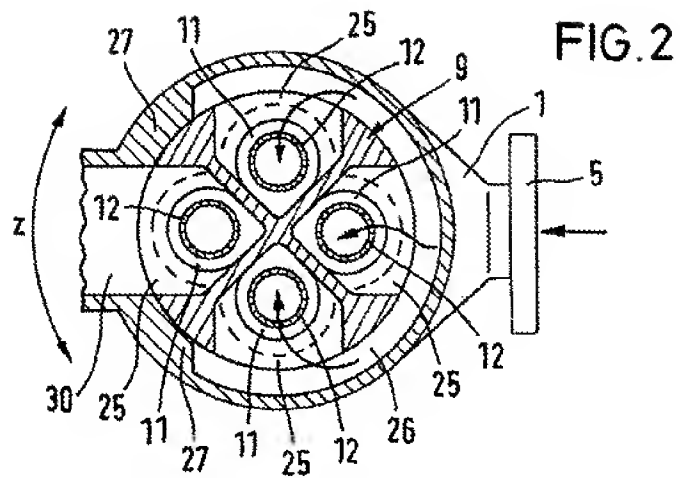
26. The backwashing filter according to Claim 24 or 25, characterized by the fact that the supply of compressed gas for the filtrate backwashing of the filter insert (12) situated in the backwashing zone (Z) or the filter chamber (11) accommodating said filter insert is connected to the interior thereof, wherein the respective filter chamber is connected to a sludge drain (8).

27. The backwashing filter according to one of Claims 24-26, characterized by the fact that the channel (28) for supplying the compressed gas is arranged in the base section (2) and preferably connected to the plate opening (18) leading into the filter candle in a sealing fashion by means of a sealing bushing (29) that can be elastically adjusted relative to the perforated plate (17).

28. The backwashing filter according to one of Claims 24-27, characterized by the fact that the filter housing (1) features a head room (30), is connected to a filter chamber (11) situated in the backwashing zone, with a float-controlled ventilating valve (31) on the opposite end referred to the compressed gas supply.

29. A backwashing valve according to one of Claims 1-28, characterized by the fact that the rotary drive (4) consists of a controlled stepping motor, particularly a pneumatic motor.





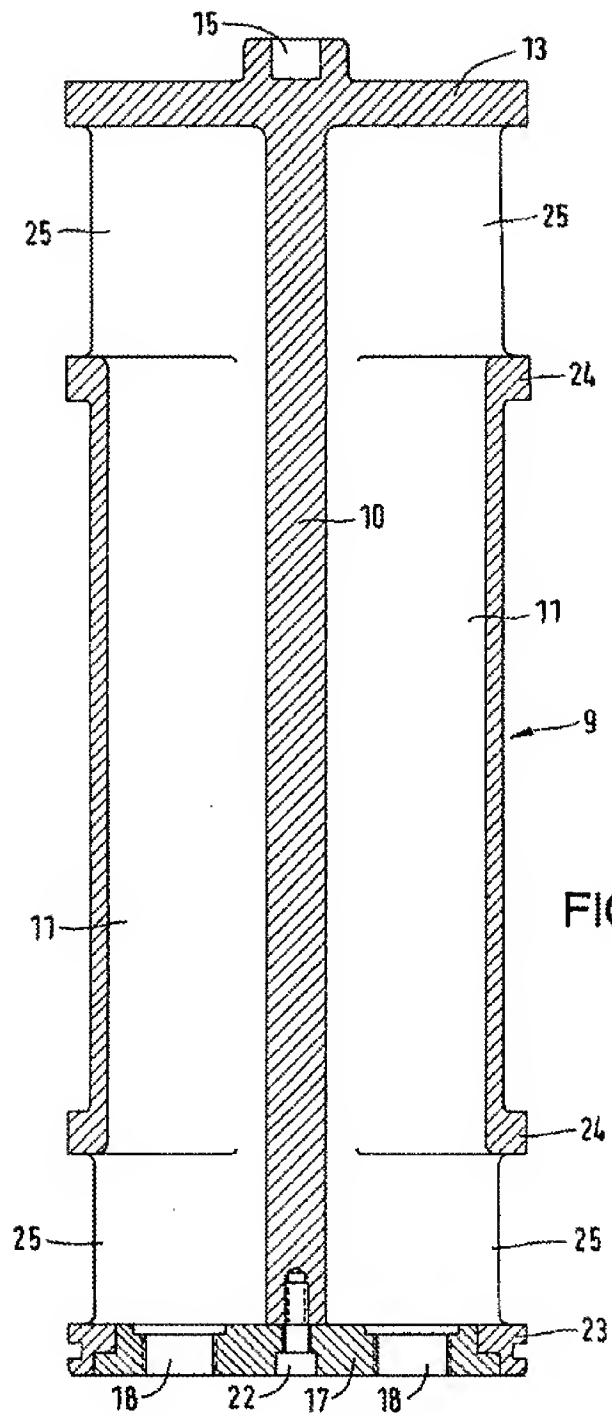


FIG.5

EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ⁶)
X	DE 34 05 179 A (DEUTSCHE VERGASER GMBH CO KG) August 14, 1985	1-9, 12, 13, 18, 24 15-17, 20,29	B01D29/11 B01D29/54 B01D29/66
Y	* Page 8, Line 7 – Line 25 *		
Y	--- WO 92 17263 A (MEMTEC AMERICA CORP) October 15, 1992 * Page 20, Paragraph 2; Figure 2 *		
Y	--- FR 2 128 742 A (BRIEDEN & CO MASCHF K) October 20, 1972 * Page 7, Last Paragraph; Figure 2*	20, 29	TECHNICAL FIELDS SEARCHED (Int. Cl. ⁶) B01D
A	--- US 2 985 306 A (STATZELL) May 23, 1961 * Figure 2 *	1-29	
A	--- FR 1 130 258 A (HERSEY) February 4, 1957 * Figure 1 *	1-29	
A	--- WO 96 02371 A (SCHENK FILTERBAU GMBH; REIJNEN KEES ERIC THEODOOR (DE); ELGHOSAIN) February 1, 1996 * Figures 4, 5 *	1-29	
The present search report has been drawn up for all claims.			
Place of search The Hague		Date of completion of the search September 24, 1998	Examiner P. De Paepe
<p align="center">CATEGORY OF CITED DOCUMENTS</p> <p>X: Particularly relevant if taken alone. T: Theory or principle underlying the invention.</p> <p>Y: Particularly relevant if combined with another E: Earlier patent document, but published on, or after document of the same category. the filing date.</p> <p>A: Technological background. D: Document cited in the application.</p> <p>O: Non-written disclosure. L: Document cited for other reasons.</p> <p>P: Intermediate document. </p> <p> &: Member of the same patent family, corresponding document.</p>			